



Volume 3 Number 16

\$2.95

August 21, 1984

IBM in Command: *Robotics and Process Control*

FIRST LOOK!
AT&T's PC 6300

DATA BASE 8 More Programmable
Database Managers

In PC News:
Upstart **ENABLE**
Targets Integrated
Market

Flicker-Free
IBM Color
Graphics

Micro (soft):
FORTRAN Spoken
Here

An Audio Rainbow!
Ariel Spectrum
Analyzer

Route Scheduling:
PC Picks the Path



THE WORLD'S MOST POPULAR

UNIX

SYSTEM

FOR THE

IBM PC

AND

LISA 2

Now, SCO brings the world's most popular version of AT&T's UNIX™ Operating System — and a comprehensive line of applications software — to the IBM® Personal Computer™ and the Apple® Lisa 2™. XENIX™ from SCO is simply the best microprocessor-based UNIX you can buy. No one else in the UNIX business provides you with better support, and no other version of UNIX gives you all these features:

VISUAL SHELL:

The XENIX visual shell provides you with a screen-oriented, menu-driven interface—with selectable color for the IBM PC.

MULTIUSER:

With XENIX, 3 or more users may efficiently use a single IBM PC or Lisa 2 simultaneously.

MOST APPLICATIONS:

With nearly 80% of all micro-based UNIX systems running XENIX, more applications are available for XENIX than for any other version of UNIX.

MULTISCREEN™:

SCO's Multiscreen™ allows you to run multiple programs simultaneously and view each program's screen with a touch of a key.

MOST COMPLETE:

XENIX is the most complete version of the UNIX System available for micros — including Microsoft's commercial enhancements and key extras from Berkeley 4.2 UNIX.

PC-DOS:

XENIX lets you read and write PC-DOS files on the IBM PC—and a cross-development environment will be available soon.

DOCUMENTATION:

SCO's XENIX documentation is written to meet the needs of the small systems marketplace — well-organized, clear, concise.

The powerful family of XENIX systems software and applications is available today from SCO — your UNIX Systems Software Company since 1978 — to set a new standard for personal computer productivity.

SCO
THE SANTA CRUZ OPERATION

YOUR UNIX SYSTEMS SOFTWARE COMPANY

500 CHESTNUT STREET
P.O. BOX 1900
SANTA CRUZ, CALIFORNIA 95061

408/425-7222

Let's go to work.

CIRCLE 118 ON READER SERVICE CARD

UNIX is a trademark of Bell Laboratories.
IBM is a registered trademark and IBM PC IBM Personal Computer are trademarks of International Business Machines Corp.
Apple is a registered trademark and Lisa 2 is a trademark of Apple Computer, Inc.
Microsoft is a trademark of Microsoft Corp.
XENIX is a trademark of The Santa Cruz Operation, Inc.
© 1984 The Santa Cruz Operation, Inc.

UCSD PASCAL[®] NOW HAS WINDOWS

**NOW AVAILABLE
FOR MS-DOS!
CALL FOR DETAILS**

**CREATE EXCITING
WINDOW PRODUCTS
IN THE LANGUAGE
EVERYONE SPEAKS
FOR A PRICE THAT
SPEAKS FOR ITSELF.**

It's easy. It's quick. And now
with this special offer, it's very
inexpensive.

We started with UCSD Pascal
and the p-System™—the world's
best integrated software develop-
ment environment. Then we made
it even better.

We added Insight Window
Designer™. This powerful tool kit
can save you thousands of lines
of code and hundreds of hours of
programming.

You can create and execute
your application on almost any
microcomputer with at least 64k
memory, including the IBM® PC,
IBM XT, IBM PCjr., Apple® IIe,
and DEC Rainbow™.

You'll move windows, select
from a palette of colors, edit and
transfer text, employ pick lists,
create hierarchical menus, pro-

vide on-line help and develop in-
tegrated applications.
But what's really amazing
is the price.

While this special introductory
offer lasts, you get SoTech
Microsystems' UCSD Pascal
compiler, the p-System operating
system and Insight Window
Designer, all for only \$399.
That's almost half price.

And if you already use UCSD
Pascal and the p-System, you can
add Insight for only \$99.

Call or write. We'll tell you all
about it. But with a package price
like this, why not order today?

Contact: End User Sales,
SoTech Microsystems,
16885 West Bernardo Dr.,
San Diego, CA 92127
619/451-1230

**SPECIAL \$399
OFFER EXPIRES
SEPTEMBER 1, 1984**

soTech
MICROSYSTEMS

CIRCLE 122 ON READER SERVICE CARD

Insight Window Designer and p-System are trademarks of SoTech Microsystems, Inc.
UCSD Pascal is a registered trademark of The Regents of the University of California.
IBM is a registered trademark of International Business Machines.
Apple is a trademark of Apple Computer, Inc.
Rainbow is a trademark of Digital Equipment Corp.

DATABASE III



More power to you.

Remember the magic you expected when you first purchased a PC?

It's here.

dBASE III™ is the most powerful database management system ever created for 16-bit microcomputers. It pulls every ounce of energy out of your PC and puts it to work.

On top of that, it's fast and it's easy.

You've never seen anything like it.

dBASE III can handle over a billion records per file, limited only by your computer system. You can have up to ten files open, for sophisticated applications programs.

When you have two related files, information in one can be accessed based upon data in the other.

dBASE III now handles procedures, parameter passing and automatic variables. You can include up to 32 procedures in a single file. With lightning speed. Because once a file is opened, it stays open. And procedures are accessed directly.

Easier than ever.

dBASE III uses powerful yet simple commands that are the next best thing to speaking English.

If you're unsure of a command, HELP will tell you what to ask for.

If you don't know what command comes next, a command assistant does. All

you have to know is what you want it to do.

Our new tutorial/manual will have you entering and viewing data in minutes rather than reading for hours.

And to make matters easier, you get a full screen report setup for simple information access.

Faster than no time at all.

dBASE III isn't just fast. It's ultra-fast. Operating. And sorting. Even faster, is no sorting. Because dBASE III keeps your records in order, so you really don't have to sort anything. Unless you want to. Then watch out!

What about dBASE II*?

It's still the world's best database management system for 8-bit computers. And it's still the industry standard for accounting, educational, scientific, financial, business and personal applications.

Tap into our power.

For the name of your nearest authorized dBASE III dealer, contact Ashton-Tate, 10150 West Jefferson Boulevard, Culver City, CA 90230. (800) 437-4329, ext. 333. In Colorado, (303) 799-4900.

ASHTON-TATE 

© Ashton-Tate 1984. All rights reserved. dBASE III and Ashton-Tate are trademarks and dBASE II is a registered trademark of Ashton-Tate.

Win an EAGLE PC Plus II from Micro Mart

Prize includes 13" RGB Color Monitor, 128K RAM, Two Floppy Disk Drives, SuperCalc³, MS-DOS 2.0 and CP/M-86.



That's right! You can win a new **EAGLE PC Plus II** micro system from Micro Mart. **FREE!** One lucky winner will be drawn at random on Sept. 29, 1984. All entries must be postmarked by Sept. 23, 1984. No purchase is necessary, but offer is void where prohibited by law. Anyone professionally associated with Micro Mart is ineligible.

Micro Mart is a registered trademark of Micro Mart, Inc. Eagle is a registered trademark of Eagle Computer, Inc.

AMERICA'S PC SPECIALIST MICRO MART

See Our Ads P.40 & Back Pages

☐ **YES!** I want to enter Micro Mart's "FREE EAGLE" Contest.
☐ **YES!** Keep Me Posted on Product Pricing and Availability.
Mail today to: "FREE EAGLE", 3159 Campus Drive, Norcross, GA 30071

Name _____
Company (if any) _____
Street Address _____
City/State/Zip _____
Tel. Day _____
Evening _____

Official 'Free EAGLE' Entry Form

CIRCLE 159 ON READER SERVICE CARD



The Independent Guide to
IBM Personal Computers

PUBLISHER	Jeff Winner
EDITOR	Bill MacIntyre
EXECUTIVE EDITORS	Mike Edlhart, Connie Winkler
MANAGER, COPY EDIT	Anne Freed
MANAGING EDITOR	Barry Owen
SPECIAL PROJECTS EDITOR	Paul Senfner
TECHNICAL EDITOR	Craig Stark
ASSISTANT MANAGING EDITOR	Senait Hurley
SENIOR COPY EDITOR	Jennifer de Jaeg
ASSOCIATE EDITORS	Barbara Krasoff, Stephanie Stollings
TECHNICAL ASSISTANT	Michael D. Cole
PRODUCTION EDITOR	Paul Ross
ASSISTANT EDITORS	Jean Aelick, Lisa Kleiman, James Langdell, James Lewis, David Obeglio, Fredric Paul, David Baker, Cheryl Goldberg, Nina Kirschner, Jane Masner, Ron Tobias
EDITORIAL ASSISTANTS	Jim Kurlit
OFFICE MANAGER	Richard Adams, Frank J. Derfler, Jr., Will Faust
CONTRIBUTING EDITORS	Stephen Maes, Peter Norton, Martin Porter, Winn L. Rosch, Corey Sandler, Ruth A. Superstein, Jared Taylor, Robin Webster, Gerald Curney, Michael Espinola
PROOFREADERS	
EXECUTIVE ART DIRECTOR	Mich Sheink
ART DIRECTORS	Mary Zink, Gerard Kunkel
ART EDITOR	Martine Nemes
ASSISTANT ART DIRECTORS	Ronays Migdal, Louise White
MECHANICAL ARTISTS	Monique Calabro, Ilva Goodheart
PRODUCTION ARTIST	Susan Ahlman
SUBSCRIPTION DIRECTOR	Cher Kilmartin
DIRECT MAIL MANAGER	Eric A. Bernhard
RENEWAL AND BILLING MANAGER	Shane Boel
MEDIA MANAGER	Ann Pulcinne
SPECIAL SUBSCRIPTION SALES	Daniel Rosenweg
ADVERTISING DIRECTOR	Eugene Duncan
DISTRICT MANAGERS	
NORTHERN CALIFORNIA AND NORTHWEST	David Repler (415) 594-2290
SOUTHERN CALIFORNIA	Barbara Farkas (213) 387-2100
NEW ENGLAND AND NEW YORK	Ellen Anderson (212) 725-7947
MIDWEST	John Henshaw (312) 346-2600
MIDATLANTIC AND SOUTHEAST	Bob Ottow (212) 725-7947
ADVERTISING SALES MANAGER/TELEMARKETING	Pauline Scherer
ACCOUNT REPRESENTATIVES	Jane Anderson, Lisa Koplman, Kathy Knecht, Tom Leibacher, Anne Robben, Jan Schatz, Pats Schwartz, Pam Sigal, Helen Forgnie, Scott E. Pearl
ADVERTISING COORDINATORS	Mary Alice De Paola
ASSISTANT TO THE PUBLISHER	
ADVERTISING OFFICE	Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016 (212) 725-7947
FOUNDER	Anthony Gold

CONSUMER COMPUTERS & ELECTRONICS MAGAZINE DIVISION

PRESIDENT	Larry Sporn
VICE PRESIDENT MARKETING	J. Scott Briggs
VICE PRESIDENT CIRCULATION	Casale Mandel
VICE PRESIDENT GENERAL MANAGER	Eden G. Mukerwitz
VICE PRESIDENT LICENSING AND SPECIAL PRODUCTS	Jerry Schneider
VICE PRESIDENT, CREATIVE SERVICES	Hebert Stern
CREATIVE DIRECTOR	Peter J. Blank
EDITORIAL DIRECTOR	Jonathan D. Lazarus
MARKETING MANAGER	Rosie Sonnenberg

ZIFF-DAVIS PUBLISHING

President Richard P. Fries, President, Consumer Magazine Division Albert S. Truax, Executive Vice President, Marketing and Circulation Paul H. Chock, Senior Vice President Philip T. Heffernan, Senior Vice President Sidney Holtz, Senior Vice President Edward D. Mahdall, Senior Vice President Philip Fine, Vice President David Davis, Vice President George Mortimer, Vice President Roy Patis, Vice President William L. Phillips, Treasurer Selwyn Tashman, Secretary Bertram A. Abrams

PC: The Independent Guide to IBM Personal Computers (ISBN 0-91075-250-0) published bi-weekly for \$24.97 for one year (26 issues); \$41.97 for two years, and \$61.97 for three years. Subscriptions are sent to the U.S. and other foreign countries. PC Communications Corp., a subsidiary of Ziff-Davis Publishing Co., One Park Ave., New York, NY 10016. Second Class postage paid at New York, NY 10016 and at additional mailing offices. POSTMASTER: Address changes to PC: The Independent Guide to IBM Personal Computers, P.O. Box 3465, Boulder, CO 80521. Editorial and Business Office: One Park Ave., New York, NY 10016. Editorial (212) 725-7947. Advertising (212) 725-7947. For subscription inquiries and orders, write to PC Magazine, P.O. Box 3465, Boulder, CO 80521. PC is an independent periodical, not affiliated in any way with International Business Machines Corporation (IBM), a registered trademark of International Business Machines Corp. Later copies Copyright © 1984 PC Communications Corp. All rights reserved. Reproduction in whole or in part without permission is prohibited. The software and trademarks of PC Communications Corp. PC: The Independent Guide to IBM Personal Computers, PC Mail PC Lab PC Communications, Powers PC, PC Tutor, PC BookBox, Time to Act PC, New, Periodicals: Material in the publication may be reproduced in any form without permission. Requests for permission should be directed to Ann Langsdorf, Ziff-Davis Publishing Company, One Park Ave., New York, NY 10016. Editorial Communications may be addressed to: ZIFF-DAVIS, BUREAU, (212) 725-7947 or (212) 725-7947.



The new HERCULES Color Card gives you the parallel port IBM forgot—for \$1 more.



And it fits into the XT's short slot.

The new Hercules Color Card gives you these five important features.

1. A parallel printer port. If you buy IBM's color card, you won't get a parallel port for a printer. Ugh. You've just wasted a valuable slot for an extra printer card.
2. It's short. Our new Color Card uses advanced gate array technology to reduce the chip count by 30 and use less than half the board space IBM does. Which makes the new Hercules Color Card perfect for the short slot in an XT.
3. Fully IBM compatible. Any program that runs on IBM's color card will run on the new Hercules Color Card. With RGB or composite video, any IBM compatible monitor will work too.
4. Hercules Graphics Card compatible. If you have a Hercules Graphics Card (model GB101 or later), or plan to buy one, an ingenious software switch on our new Color Card allows both cards to be kept in the system at the same time.
5. Low price. At a suggested list price of \$245, the new Hercules Color Card has all these features for only \$1 more than IBM's color card.



Call for our free information kit. See why the company that made the first graphics card for the IBM PC still makes the best.

**Hercules. We're
strong on graphics.
800 255 5550 Ext. 420**

Address: Hercules, 2550 Ninth St., Berkeley, CA 94710 Ph: 415 540-6000 Telex: 754063
Computers/Canada; Ediflex/U.K.; Computer 2000/W. Germany; Ediflex/France; SourceWare/Australia. Trademarks Owners: Hercules/Hercules
Computer Technology; IBM/International Business Machines.
Suggested List Price as of 2.22.84 for the IBM Color Graphics Adapter.

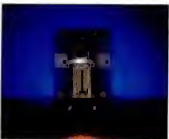


The Independent Guide to
IBM Personal Computers

VOLUME 3 NUMBER 16
AUGUST 21, 1984

COVER STORIES

**Programming Factory Robots
with PCs** 120
*Barbara Krasnoff/IBM has come up with a
PC-programmed industrial assembly robot
and is using it in its own factories.*



**PCs, Peptides, and Process
Control** 128
*Robin Raskin/Biochemists can now use a
PC to control peptide synthesis.*

**A Computerized NOTEBOOK
for Scientists** 134
*Michael Muskat/LABTECH NOTEBOOK
produces printouts and graphs and analyzes
data in minutes, allowing scientists to keep
pace with the increasing speed of data
collection and manipulation.*

**A Personal Robot Goes to
Market** 140
*Robin Webster/BOB, the first personal
robot, can walk, talk, and perform a few
simple tasks. Once outside vendors teach
him new tricks, you just might want to
take him home with you.*

**The PC Interfaces with a
HERO** 146
*John Goodlet/The HERO MemCom board
from Micromation connects the PC with a
quasi-R2D2—the HERO personal robot.*



page 146



FEATURES

MARKETPLACE
A PC Mix for the Music Biz 158
*Freff/Ariel and MetroGnome are two new
companies whose products may transform the
way the music industry does business.*

SPECIAL REPORT
Project: Database, Part 6 169
This installment of Project: Database marks
the last segment of coverage of the
Category 3 databases—those with
procedural or programming capabilities. It
also includes a look at the most famous
DBMS package of all, *dBASE II*.

HARDWARE
**Monroe and Tandy Strike Out on
Their Own** 208
*Alfred Poor/New computers from Monroe
and Tandy offer fast computing in
exchange for PC-compatibility. Is the loss
of compatibility too high a price to pay?*



A Tale of Two Modems 237
*Frank J. Derfler, Jr./POPCOM X100
from Prentice Corporation and the
PC-IntelliModem from Business Computer
Corporation represent the state of the art in
modern modem design. They save you the
constant, time-consuming dialing and
redialing required by standard modems and
even have voice/data switching.*

SOFTWARE
**The PC Masters the Route Between
Truck Stops** 218
*Jan Young/Routemaster and Truckstops are
helping dispatchers to plan truck deliveries
more efficiently.*



**In Search of a Significant
Dialog** 265
*Howard A. Karten/In-Search is a program
that holds your hand as you move step by
step through the complex command
structure of Dialog database.*

PROGRAMMING
**Adapting Your Display for Speedy
Updates** 225
*David McManigal/Use the FULSCRN
program to achieve instantaneous screen
updates with your own BASIC programs
while avoiding the common problem of on-
screen "lightning."*

LANGUAGES
**Using MS FORTRAN on
the PC** 255
*Daniel Holzman/Microsoft's FORTRAN
compiler offers programmers the chance to
transfer mainframe skills, techniques, and a
vast library of scientific and engineering
programs to the PC.*



page 255



page 158

PRO COLUMNS

SCIENCE

Micros and Microbes 289

Dean Madar, M.D./Microbe puts a micro—instead of a dedicated hospital laboratory computer—to work handling data retrieval in one hospital's microbiology laboratory.

FINANCE

Keeping Up with the IRS: PC Taxmasters 295

Donald R. Woodwell/Your investment today in software for tax planning and preparation may bring you a favorable return next April.

BUSINESS

Insuring Against the Perils of PC 301

Paul Cottrell and Barry D. Weiss/Here's a look, from a legal perspective, at insuring your microcomputer with property and liability coverage.

EDUCATION

Courseware Basics 305

Harold Goldes/Whether you design or evaluate educational software, you should know the elements that go into creating quality teaching aids.

PROGRAMMING

Tips on dBASE II 351

P.L. Olympia/Although making use of dBASE II's power may not be easy, these simple procedures can help turn you into a dBASE II pro.

TELECOMMUNICATIONS

Board Modems: The Inside Story 383

M. David Stone/Board modems can do everything their standalone counterparts can, and for less money. Moreover, they come bundled with communications software.

DEPARTMENTS

WHAT'S INSIDE 15

PC NEWS 33

Twelve pages of up-to-the-minute reports, interviews, minireviews, and useful tips, along with entertaining tales and fables from the computer community.

FROM THE EDITOR'S SCREEN

We're Clean 83

Bill Machrone/A word of encouragement to those who are struggling to clear their consciences by clearing their shelves of bootlegged software.

GUEST EDITORIAL

Caveat Emptor 91

David M. Allen/A few tactics for navigating the murky waters of the PC marketplace.

LETTERS TO PC 93

THE NORTON CHRONICLES

Missing Pieces of PC-DOS 107

Peter Norton/IBM left a few useful utilities out of its customized version of DOS.

PC ARCADE

Ultimate Sorcery 271

Phil Wiswell/Ultima II and Sorcerer present heaping portions of fantasy and adventure fun.



BOOK REVIEW

Great Summer Reading: A Dynamic Duo 279

Phil Wiswell and A. Scott Earle/A volume of tips on designing games, and a compendium of useful information on computing.

NEW ON THE MARKET 313

David Obregon/The latest in hardware, software, accessories, publications, and services for your PC.

PC BLUEBOOK 328

PC: MART 342

CLUB NEWS

User Group Status Report: IBM Support 347

Randall J. Corgan/IBM's PC user group support has its problems, but it still represents an important first step.

PRODUCT INDEX 363

USER-TO-USER 368

Paul Somerson/PC owners share their tips and short programs.

PC TUTOR 377

Mark Zachmann/PC answers readers' technical and nontechnical questions about personal computing.

INDEX TO ADVERTISERS 391

COMING UP 387

PCjr 387

PC Tech Journal 388

PC Disk 389

PC Magazine 395

Cover Photograph:
Dennis Chalkin

Chart-Master™ turns volumes of complex data into easy-to-understand graphics.



"A picture is worth a thousand words." With this simple concept as a building block, Chart-Master is changing the way busy executives, analysts and secretaries look at, interpret and present information. In a fraction of the time required to wade through volumes of printouts, you can



Values printed at data points, both left and right Y-axis scales, floating legends & bars, both horizontal & vertical formats, exploded pie sections

produce easy-to-understand bar charts, pie charts and scatter diagrams quickly and dramatically. Chart-Master makes it easy to customize reports and presentations with six different fonts, label placement, proportional pie charts and more.

Menu-driven Chart-Master allows you to enter data and select a chart format at the press of a button. You then preview your selection on your personal computer screen as it would appear in final form. Or, you can review the various Chart-Master graphic options to make sure you have selected the most effective format. When satisfied,

you can transfer your selection to paper or acetate transparencies for a colorful, presentation-quality chart in seconds.

Chart-Master presents a clear picture of the "bottom line," which conveyors of information understand and decision makers appreciate. That's why major corporations like GE, Eastman Kodak, Exxon, Union Carbide, GM, AT&T, DuPont, 3M, Citibank, Motorola, Procter & Gamble, and GTE rely on Chart-Master to translate "volumes of complex data into meaningful information."

Chart-Master supports the IBM Instruments XY750, Panasonic VP Series, Houston Instruments DMP29, Yokogawa PL1000 and Strobe plotters, in addition to the Hewlett-Packard family of plotters, for use with IBM PC and other compatible computers.

The retail price of Chart-Master is \$375. For a complete information kit and name of your nearest dealer, contact Decision Resources, Inc., 25 Sylvan Road S., Westport, CT 06880. (203) 222-1974.

DecisionResources
Software Designed for Decision Makers

SIGN-MASTER™

Number 1 in word charts for presentations and reports

Create powerful headlines using SIGN-MASTER's color, size, and font options. Here we chose Bold Roman font.

Highlight a single character, word or an entire line at the touch of a button. Here we focus attention on one number with color and underline.

Indicate source, date, author, etc. with SIGN-MASTER's footnote option. Bold Standard font was used in this example.

THE BOTTOM LINE
PROJECTED EARNINGS
(Millions of \$)

	'78	'79	'80	'81	'82
Sales	88.4	121.0	144.0	163.8	182.0
Net Income	5.0	8.8	11.4	13.4	15.7
ROS(%)	6.0	7.3	7.9	8.2	8.6
Mkt. Share	48.7	61.7	65.7	71.7	76.7

Capital expenditure required: \$5 Million
Net present value = \$24.25 Million
(opportunity cost of capital = 24%)

(Source: Annual Report)

Develop professional tables quickly and easily. Once data and text is entered, SIGN-MASTER determines the spacing and layout.

Produce SIGN-MASTER word charts on paper, overheads or slides.

With SIGN-MASTER, the possibilities are limitless:



Proposals

SUMMARY FINANCIAL DATA

Year	1978	1979	1980	1981	1982
Assets	100.0	120.0	140.0	160.0	180.0
Liabilities	20.0	25.0	30.0	35.0	40.0
Equity	80.0	95.0	110.0	125.0	140.0

Summaries



Exhibits

SCHEDULE

Activity	Start Date	End Date	Status
Project A	1/1/80	3/31/80	Complete
Project B	4/1/80	6/30/80	In Progress
Project C	7/1/80	9/30/80	Planned

Schedules

FINANCIAL SUMMARY

Category	Value
Revenue	\$100.0M
Expenses	\$80.0M
Profit	\$20.0M

Tables



Title Pages



SIGN-MASTER is the first program designed to allow everyone from top management on down to produce colorful, attention-gaining "word charts" and tables for presentations and reports.

Created on a PC with a compatible plotter or printer, SIGN-MASTER word charts are superior in quality to typing and less expensive than typesetting or printing.

Professional Word Charts Made Easy

In just minutes, this unique menu-driven program lets you create impressive, easy-to-read documents using words, numbers, lines and SIGN-MASTER's simple-to-master Table Mode.

Number 1 In Quality Text

SIGN-MASTER offers the greatest variety of text options. In addition to 6 fonts, 16 sizes and 8 colors, you can justify text, underline, italicize, set margins, spacing, and more.

An Important Presentation Tool

With SIGN-MASTER and any one of over 40

plotters, you can produce full color originals on paper and overheads. The program also works with over 10 printers to create the highest quality printer graphics available.

Make Super Slides Quickly and Economically

Presentation-quality 35mm slides can be created in-house and inexpensively using the Polaroid Palette in conjunction with SIGN-MASTER.

For reports and presentations that get noticed, get SIGN-MASTER — Number 1 in word charts.

The retail price is \$245.00. Call or write today for a complete information kit and a demonstration at your nearest dealer. Decision Resources, Inc., 25 Sylvan Road South, Westport, CT 06880 (203) 222-1974

SIGN-MASTER is a trademark of Decision Resources, Inc.

CIRCLE 145 ON READER SERVICE CARD

DecisionResources
Software Designed for Decision Makers



Can Your Word Processor Keep Up With Your 100 WPM Typist?

It can if you have WordPerfect!

Try this test. While using your favorite word processor, put the cursor in the middle of a paragraph, turn insert on, and type. Surprisingly, very few of the leading word processors can keep up with 70, 60, or even 50 words per minute. WordPerfect keeps up easily at speeds well above 100*.

Now, maybe this doesn't matter to you, because you don't type 100 or even 50 WPM. But you still don't want to wait forever to go to the beginning of your document, go to page 5, save your document, or add a paragraph.

At SSI anything less than fast is unacceptable. And not just because time is money, or because wasting time is foolish.



Delays are very frustrating, and frustration can easily lower the quality of your writing.

Try WordPerfect.

WordPerfect

**You'll love it—
not only for the
features we've built in,
but also for the
delays we left
out.**



*Based on tests performed on an IBM PC.

SATELLITE SOFTWARE INTERNATIONAL

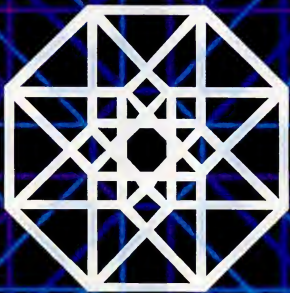
288 WEST CENTER STREET, OREM, UTAH 84057 (801) 224-4000 TELEX 820-618

SSI

“+++”

CIRCLE 34 ON READER SERVICE CARD

**For the first time, you can get
three types of computer
communications systems from
just one company. Quadram.**



Now Quadram Makes Communications as easy as 1, 2, 3.

When it comes to enhancement products for IBM® PCs and other personal computers, no one can beat Quadram. In fact, if you use spreadsheets or large databases, you're probably using a Quadram product already.

Now Quadram applies their expertise to communication devices. Not just modems, but a full range of other products, too. So that you can do anything from networking many PCs together to giving your PC full 3278 terminal emulation in an IBM mainframe environment.

Only Quadram gives you such a selection—complete with options and upgrade capability. So now it's easier for you to design the perfect system for your needs. All you need to do is remember one name—Quadram.

1. Quadmodem™ From your home or office, reach out and touch something.

Just because your computer is all alone, that doesn't mean it has to be lonely. Not when you've got Quadmodem.

Quadmodem is a complete intelligent modem package, including an integral or standalone modem with supporting documentation. Each modem comes with QuadTalk—a powerful communications software package plus an introductory offer from The Source™.



Just pick the model that's right for you and your computer.

The Integral Unit drops into an IBM PC, XT, PCjr or Apple IIe.

The Stand Alone is an intelligent modem that connects to your system through an RS-232 port.

Both have enhanced diagnostic capability to troubleshoot not only your system, but the

system at the other end of the phone line. And both have call progress monitoring to automatically determine and compensate for different types of phone systems and transmission status (human voice, busy signal, data or dial tones). Of course, both plug directly from your computer into your phone jack.

Get the modems with the name for quality. Quadmodem™ Fully compatible with Bell 103/212A dial-up modems and the most popular modem brands.

2. Quad3278™ Let an IBM PC communicate with an IBM mainframe.



To integrate your PC into a mainframe environment, look to Quadram first.

Because now you can have all the features of the IBM PC (mass storage and peripherals) plus the incredible power of a mainframe right at your desk. All it takes is Quadram's 3278 emulation package which includes hardware, software, even cabling.

To make your IBM PC emulate the 3278 Display Work Station, get the Quad3278™. Once you're on-line the IBM mainframe sees you as just another 3278 terminal. Little does it know that you're actually a high-performance, intelligent work station, with all the functions of the Personal Computer. With mainframe support you can download data, process it on your PC, even store it on your own disk for later reference.

Make the connection from micro to mainframe. And back it up with Quadram quality. It's the logical step for the future.

3. Quadnet™ Turns your IBM PC's into a Local Area Network.

Local Area Networking (LAN) is one of the most interesting and useful ideas to come

down the pike. Basically, it allows you to inter-link a group of computers together so they can share information and peripherals with each other.



And now with Quadnet, you don't have to compromise your system to fit our system. Instead, you can easily link as few as two, or as many as 255 IBM PCs together in a hard-wired network. And you can configure them almost any way you want. They can work independently of each other or share resources and peripherals.

The possibilities are endless. But the important thing to remember is that Quadnet gives you a choice with four different Network Systems. Choose the one that meets your price and performance needs.

Quadnet grows as you grow. Yet the user commands stay the same, thanks to the upward compatibility of the Quadnet operating software.

Whichever version you hook on to, you get a complete package (hardware, software, and documentation). And most importantly, you get Quadram's reputation for quality.

QUADRAM QUALITY



At Quadram, we don't make personal computers. We just make them better. So insist on the Quadram name. It's your assurance that you're buying from one of the most established and involved

companies in the microcomputer field. Ask your dealer about us.

IBM® PC, XT, PCjr are registered trademarks of International Business Machines Corporation.

™The Source is a registered trademark of Source Telecomputing Corporation.

APPLE IIe is a registered trademark of Apple Computers, Inc.

© Copyright 1984 Quadram Corporation. All rights reserved.



An Intelligent Systems Company

4355 International Blvd./Norcross, Ga. 30063
(404) 923-6666/TWX 510-766-4915 (QUADRAM NCRS)

INTERNATIONAL OFFICES

Interquadram Ltd., 442 Bath Road, Slough, England SL6 6BB
Tel: 0235-52000 Telex: 847150 Aventura G Interquadram GmbH
Friedenweg 7, 6000 Katernbach, West Germany Tel: 0207-3088
Tel: 07770 Sina G Interquadram s.r.l. s.p.a. Via Vercelli 10522 Novara
Tel: 754-040 Telex: 620042 Nov Bus. Chieva Computing 6501 Normal
Road, Mississauga, Ontario Canada L4N 2X5 Tel: 416-621-7600

The Perfect Match



Davong has a beautiful way to solve both your hard disk storage and backup needs. Our new DataSystem for IBM® PCs. **Davong combines good looks with data storage.**

We offer a full range of disk sizes, all including a hard disk drive plus tape backup unit. And the capability of using the tape as a start/stop systems device.

In fact, this Davong DataSystem has a lot of other beautiful benefits, too. Like compressed or full-volume backup with file-by-file or full-volume restore. And automatic flaw mapping to ensure complete media interchangeability.

Our full XT compatibility actually offers performance a cut above other XTs. And if you want even higher performance and password protection, you can use our Multi-OS® software.

To top it off, there's the sleek, contemporary styling of our DataSystem. And a low price that's equally attractive.

**Davong
DataSystem
for IBM
PC's.**



*Multi-OS is a registered trademark of Davong Systems, Inc.

®IBM is a registered trademark of IBM Corp.

Davong Systems, Inc.
217 Humboldt Court
Sunnyvale, CA 94089
(408) 734-4900 Telex: 176386

CIRCLE 219 ON READER SERVICE CARD



What's Inside

The cast of characters who contributed to this issue includes a Brooklynite, a process control whiz, a British guy, and two robots named HERO and BOB.

Let's get one thing straight. Just because *PC Magazine* features all these top-notch writers and literate, intelligent articles, you may have the impression that the editor who writes this column talks like a combination of Bill Buckley and Alistair Cooke. I got news for you. You're dead wrong.

Sometimes I get real tired of calling people on the phone and hearing them say, "Hey, you don't talk the same way you write!" So to set the record straight, this column is going to be written in good old Kings County (that's Brooklyn to all you out-of-towners) English.

To begin with, let's talk robot. These guys at *PC Magazine*, they seem to think that there is something awesome about what's been happening lately with robots, process control, and the IBM Personal Computer. They figure that being able to run a robot—or factory, or a laboratory—without having to deal with some pretty heavy hardware is something to let people in on.

I mean, let's look at IBM itself. *PC* shipped associate editor Barbara Krasnoff down to Boca Raton, Florida, in weather that would wilt a cactus so that she could take a gander at their Robotic Assembly Institute. They got some cute little numbers there—the IBM 7535, 7540, and 7545—that can grab hold of a whatsit, check it out for problems, and



then place it somewhere else quicker than you can say "intelligent automation." And what teaches those mechanical marvels how to do what they do so well? A little two-disk drive PC, that's what. And as long as she was down there, Krasnoff looked in on a factory that was actually making PCs—and using other PCs to make sure that everything was kosher.

While Krasnoff was taking a stroll around the assembly line, Jan Young, who's a whiz at things like process control, wandered into a little gathering called Control Expo '84, where a bunch of industry types were showing off their latest wares. He got a real good look at a

bruiser of a PC-XT that's been specially made to hold up to whatever a factory can throw at it and then some.

Writer Mike Muskal was fooling around with those highbrow scientists who spend their time messing around with molecules and other nasty little things. He'd heard tell of this software package called *LABTECH NOTEBOOK* that does for scientists what the above-mentioned PC does for factory managers—namely, it does process control.

In fact, free-lance writer Robin Raskin actually got hold of one of these high-class thinkers, a man named Bruce Merrifield, the John D. Rockefeller, Jr., Professor of Chemistry who uses his PC to do his control processing way out at Rockefeller University. I figure if somebody with that much brainpower uses a microcomputer to do his dirty work, there must be something to all this process control stuff; am I right?

Well, I thought those *PC* people were getting a little too intellectual for my tastes. Man, was I ever wrong! They've now got these machines called personal robots—sort of like personal computers, except they have wheels—and two of them are what they call "compatible" with your everyday PC.

One of them, called HERO, has been making technofreaks happy for a couple of years now, letting them get into its

WHAT'S INSIDE

innards and make it roll over and play dead. *PC Magazine* got hold of this writer named Goodlet who let on that he could make HERO do all kinds of neat

tricks, using his PC and Lotus' 1-2-3. The PC crew called his hand, and Goodlet gave us an article explaining just how he did it.

Meanwhile, this British guy named Robin Webster put in his two cents. He went down to San Jose, California, to get the low-down on a new home robot named BOB. Now, the Androbot people who put BOB together are spreading the news that their robot is the first real, we're-not-talking-toys-here home robot. This wouldn't have excited PC in the least, except that the computer that BOB is using for brains is the same one that makes the IBM PC tick. So Webster went over to Androbot and found out the deal on the droid.

Now, the people here at *PC Magazine* are pretty tough cookies, and throwing two little guys like HERO and BOB against each other wasn't enough for them. So they took a look around and saw that there were two new microcomputers on the market that were giving out some big talk about being as good or better than the PC: the Tandy 2000 and the Monroe 2000. Well, they put those two babies in the ring, got writer Alfred Poor to officiate, and let them slug it out. Poor got a decision just in time for this issue.

And talk about looking for punishment—this issue's got Part 6 of that gigantic "Project: Database" that everybody's gabbing about. This time around, we got the rest of your Category 3: the databases that have procedural languages.

Associate editor Stephanie Stallings, who's been keeping tabs on all these packages, let out that reviewing the databases was "a challenge for our writers." Now, Stallings is a soft-spoken, polite sort of editor, so when she uses a word like *challenge*, you know that those writers had to do some real work.

The boys in this particular ball club are real hard-hitters: *Condor 3*, *MAG/base III*, *RL-1 DATABASE*, *OPTIMUM*, *Day One*, and finally *dBASE II*, the player that threw out the first pitch and gave all the others something to aim for.

In other words, this issue of *PC Magazine*'s got some real interesting stuff. You think I'm talking up my sleeve? All you gotta do is turn the page. ■

Data worth keeping deserves a Data Defender.



Data Defenders by Ring King. They're the finest quality protection you can buy for the information you have stored on 5¼" mini-diskettes and printout.

The Ring King 070 Tray holds 70 mini-diskettes in a tough copolymer shell with security lock. The Ring King Flip File II binder holds 20 mini-diskettes and converts to a desktop index. Ring King Looseleaf Files are punched to fit standard 3-

ring binders. Ring King Data Binders hold up to 8" of 9½" x 11" or 14½" x 11" unburst printout.

Ask for Ring King Data Defenders at your computer supply dealer. Or send for our free, full-color catalog of computer support products. Write Ring King Visibles, Inc., 2210 Second Avenue, P.O. Box 599, Muscatine, Iowa 52761. For customer service, phone (800) 553-9647, in Iowa (319) 263-8144.

DATA DEFENDER



CIRCLE 116 ON READER SERVICE CARD

Even the fastest fingers slow down when they struggle with computer commands. And no matter what software you use, you still have to enter the same things over and over again.

That's why you need SmartKey II Plus,[™] the software that lets you control your computer with a single keystroke.

Add SmartKey to WordStar and you can juggle margins and insert "boilerplate" paragraphs or sentences with just one key. Add it to Lotus 1-2-3 and you can concentrate on the numbers instead of the mechanics. You can even tap into Dow Jones with the press of a finger.

Don't type in the same thing twice. SmartKey can remember commands, words, paragraphs, even entire letters. With SmartKey, you can work faster and never worry about which keys to press.

It's easy to see why thousands of people all over the world are already using SmartKey to make their lives easier.

SmartKey II Plus features.

Assign more than 30,000 characters to a single key. Define over 300 function keys on any computer. An exclusive "SuperShift" lets keys have up to seven meanings. Change any keyboard to the DVORAK or IBM Selectric layout. Keys can be redefined while other software is running. Key definitions can be saved to disk for later use. SmartKey II Plus is invisible to other software. SmartKey II Plus runs on the IBM PC and compatibles, the PCjr, and all other MS-DOS, CP/M, CP/M-86, and CP/M-Plus based personal computers.



Best of all, SmartKey II Plus is still only \$89.95.

To see how SmartKey II Plus can speed up your work, pick up a copy at your computer dealer. It's the smartest move you will ever make. Software Research Technologies, Inc., 3757 Wilshire Boulevard, Suite 211, Los Angeles, California 90010. (213) 384-5430.

**SMART
KEY II**
Plus

A Stroke Of Genius.

Corporate and OEM licenses available.

CIRCLE 252 ON READER SERVICE CARD

How to speed up the ten slowest parts of your computer.



The best IDEAs

We're IDEA. The best IDEA since the IBM® PC.

We have a full line of peripherals that are compatible with the IBM PC. But, more importantly, they're compatible with each other. So you can build a better PC, piece by piece.

Each IDEA peripheral is the best you can buy. More features. Better features. Higher quality. And all at a lower price.

IDEA is unique. Very unique. For example, we design

our own products. So they're all integrated. Meaning that they work together to give you a system that's systematic. Efficient. And compatible.

Integration also means that we don't buy someone else's ideas and resell them to you. So, if you call our Customer Hotline with a question, you'll speak with technical support people who are directly involved in the design and production of our products.

Designing our own products also assures you of

IDEAmax 384

The Multifunction Card with the unique backplane

- Serial, parallel and game ports cabled directly from the back of the board.
 - Up to 384KB of parity checked memory.
 - Includes disk emulation, printer spooler, printer selector, perpetual calendar and diagnostic software.
 - IDEA multifunction family includes IDEAmimi I/O card, IDEAplus disk host adapter card.
 - Purchase only as many options as you need.
- From \$295

IDEAcomm 1200

Internal modem for 300/1200 baud communications

- Slim profile construction uses only one slot in the IBM PC or IBM PC/XT.
- Easy-to-use, menu driven software for your communications applications.
- Runs Smartcom, Crosstalk, PC Talk and most other software.
- Extra serial port for COM1 or COM2 configuration.

\$495

IDEAcomm 3278

The performance leader for PC-to-mainframe communications

- Unique dual-ported memory design enables 20% -40% faster file transfers.
- Includes file transfer (upload/download) software for VM/CMS, TSO.
- Software configurable keyboard for customizing your application.
- 3278 Emulation, Bisync and SNA/SDLC support; coax connection to IBM 3274/3276 controllers.

\$995 Includes board and software

The IDEAmax 384



IDEAAssociates
For IBM PC and compatibles

The IDEAcomm 1200



IDEAAssociates
For IBM PC and compatibles

The IDEAcomm 3278



IDEAAssociates
For IBM PC and compatibles



ince the IBM PC.

dependability. And quality. All our boards are burned in for 168 hours. Plus, we perform functional testing on each peripheral as a system to assure reliability. As a result, every IDEA product, including disk drives, is covered by a one-year warranty.

At IDEA, we also offer you the only trade-up policy in the business. If what you buy today, you want to update tomorrow, you haven't wasted your money. You've invested it.

But having the best peripherals for the IBM PC isn't enough. They have to be available. And you'll find our products at all Math Box, Computer Depot, Amerisource, and Northeast Computer stores, as well as many Computerland, Inacom and MicroAge® locations. Call **800-257-5027** for the IDEA store nearest you.

IDEA. When all is said and done, it's little wonder why the best IDEA since the IBM PC is the best IDEA for the IBM PC.



IDEAdisk

IDEAassociates



IDEAnet

IDEAassociates



IDEAgraph

IDEAassociates

IDEAdisk

The high capacity disk system with built-in backup

- Removable Winchester cartridge: Faster, more reliable, easier to use than tape backup.
- Wide range of storage capacities: 5, 10, 15, 25 and 45 megabytes.
- Internal or external mounting versions.
- Includes high performance software for disk caching, dynamic partitioning, public or private files, self booting.
- **IDEAdisk Plus** version lets you add memory, serial and clock options without using another expansion slot.

From \$1645

IDEAnet and IDEAshare

Cost-effective networking products for the IBM PC

- IDEAshare software for up to four users.
- Fully upgradable to IDEAnet hardware and software for up to 20 users.
- All PCs on the system remain fully operational.
- No dedicated file server required.
- Security features include User IDs, passwords, file and record locking.
- Includes software for remote printing, print spooling, disk and file sharing.
- IDEAnet and IDEAshare are totally integrated with IDEAdisk.

From \$275 to \$495 per node

IDEAgraph

High resolution, high speed color graphics card

- Transforms the IBM PC into a powerful graphics workstation for CAD/CAM, medical imaging, broadcasting, graphic arts.
- 256 colors displayable at one time; up to 1024x1024 resolution.
- Analog, digital TTL and composite video outputs.

From \$995

IDEA
IDEAassociates

The best IDEAs for personal computers.

IDEAassociates, Inc., 7 Oak Park Drive, Bedford, MA 01730 (617) 275-4430 Telex 94 8245.
IDEAassociates S.A., 5, Route de Chêne, CH1201 Geneva, Switzerland (22)96 1119 Telex 428 388 KBSC

Minis and mainframes have used WordMARC for four years. Now there's WordMARC word processing for your micro.

Originally created for minis and mainframes, WordMARC is now available for use on your micro*. And quite simply, it's the best office-quality word processing software package a micro user could buy. After all, it was the best word processor mainframe and mini users like universities, national laboratories, and Fortune 500 companies could find over the last

four years. But, if you need more proof, read on.

☐ *No Problems, No Nonsense, No Competition.* For starters, every-

thing you see on your screen appears exactly as it will be printed on paper. Scientific

notation. Foreign language characters. Underlining. Subscripts. Every-

thing. ☐ *A Partial List of Features. That's Right, Partial.* Menu driven w/function keys. Easy self-

paced tutorials. Spelling checker. Mail merge. Scientific notation. Foreign language characters. Automatic reformatting. Automatic

pagination. Document recovery system. Document encryption. ASCII file handling. And so on. ☐ *If Word Processing's Your Call, Call 800-831-2400.*

Granted, just because the call is free is no reason for picking up the phone. You should stop and consider

our track record with minis and mainframes.

You should stop and think what that can mean for your micro. And you should stop thinking about any other word processing software. OK. Now that you've done that, it's time to pick up the phone.

*WordMARC is compatible with the IBM PC or XT, as well as the Eagle, Compaq, Corona, NCR PC, DEC Rainbow, and TI Professional computers. All versions of WordMARC on micro, mini and mainframe computers are compatible.



MARC Software International, Inc.
260 Sheridan Avenue, Suite 200
Palo Alto, California 94306
800-831-2400 ☐ In Calif., 800-437-9900

*WordMARC is a trademark of MARC Software International, Inc. © 1984 MSI, Inc. IBM PC and XT, Eagle, Compaq, Corona, NCR PC, DEC Rainbow, and TI Professional Computers are trademarks, respectively of International Business Machines Corporation, Eagle Computer, Inc., Compaq Computer Corporation, Corona Data Systems, Inc., NCR Corporation, Digital Equipment Corporation, and Texas Instruments.



Like father, like son.

Thanks to Microsoft® PCjr Booster with Mouse, the IBM® PCjr has grown up.

It gives jr enough memory (256KB total RAM) to run many of the same programs as PCsr. Programs like Lotus™ 1-2-3™, Microsoft Word and



dBASE II®. And jr will run them just as fast as PCsr.

PCjr Booster with Mouse. More than compatibility.

This external, plug-in accessory substantially improves the utility of programs like Lotus 1-2-3, VisiCalc®, Microsoft Word and others, because the mouse software makes them easier to use.

Since Microsoft designed the MS™-DOS operating system for the entire IBM PC family, it figures we'd be the one to bring high performance to the PCjr.

So if you'd like to improve jr's achievement, call 800-426-9400. In Washington State, Alaska and Hawaii, call 206-828-8088. And ask for the **MICROSOFT.** name of your The High Performance Software nearest Microsoft dealer.



Microsoft is a registered trademark and MS is a trademark of Microsoft Corporation. IBM is a registered trademark of International Business Machines Corporation. Lotus and 1-2-3 are trademarks of Lotus Development Corporation. dBASE II is a registered trademark of Ashton-Tate. VisiCalc is a registered trademark of VisiCorp.

True or False: You Can Now Run Apple Software in Your IBM PC.

True. Introducing Quadlink by Quadram. The revolutionary enhancement board that turns your IBM Personal Computer into an Apple-compatible system.

Quadlink. Simply plug it inside your PC, press a few keys, and instantly run most Apple software packages available.

Quadlink greatly enhances your PC's capabilities.

True. Quadlink gives you access to the largest software library ever written. Business, educational, and entertainment packages. Software for any professional or home use. This means your PC can now do more than ever before. In more ways than ever before.

With Quadlink, there's no diskette reformatting needed.

True again. With Quadlink you'll never have to worry about "compatibility." Just put your Apple diskette in the PC drive and watch it go. It's that easy. Like having an Apple computer inside your IBM.



QUADLINK™ BY QUADRAM™

And every Quadlink comes with that traditional Quadram Quality built right in.

Absolutely true.

Quadlink is available at Quadram dealers worldwide.

True. So visit the Quadram dealer nearest you today and ask to see Quadlink in action. And while you're there ask about our full line of IBM PC enhancements. Including the popular six-function Quadboard™. You'll agree: when it comes to quality engineering and dependable performance, Quadram passes the test.



4055 International Blvd., Norcross, GA 30061
(404) 523-6666 FAX 815-782-8915 (QUADRAM MCPS)

CIRCLE 521 ON READER SERVICE CARD

© Copyright 1984
Quadram Corporation
All rights reserved

Apple and the Apple logo are
registered trademarks of
Apple Computer, Inc.

IBM and the IBM logo are
registered trademarks of
International Business
Machines Corporation.



PAINLESS CHOICE.



**Albany Medical College
chose OfficeWriter™ word processing
software for good reason: It was the most
effortless PC word processing they tried.**

And they aren't alone. Frito-Lay, Wisconsin Power & Light and many other companies across the country have discovered OfficeWriter's Wang-like similarity to dedicated word processing.

Software Digest evaluators gave it a four-star rating — their highest commendation in a comparison of 30 IBM PC word processing software systems appearing in the January 1984 issue of *The Ratings Newsletter*.

Our 30-minute on-screen tutorial puts OfficeWriter at the top of its class for easy start-up.

No other system is easier to use.

Our new OfficeSpeller feature integrates the Proximity/Merriam-Webster electronic dictionary with our newest release for goof-proof text every time.

And a complete set of editing features get high marks for speed, productivity, versatility and performance.

So when you're faced with the problem of which word processing software to choose, take the painless route.

Ask us about our free 30-day trial. (Return the coupon or call 1-800-228-0747. In Wisconsin call 1-608-274-5047.) It could mark the end of your word processing software selection headaches once and for all.

IBM is a trademark of International Business Machines Corp. Wang is a trademark of Wang Laboratories Inc.

OfficeWriter™

FREE 30-DAY TRIAL

Please send me more information about a free 30-day trial of OfficeWriter!

Name/Title _____
Company Name _____
Address _____
City _____
State _____ Zip _____
Telephone # _____

Return coupon to:
OFFICE SOLUTIONS INC.
5708 Odana Road, Dept. PCM8214
Madison, WI 53719
Or telephone: 1-800-228-0747
(1-608-274-5047 in Wisconsin)



CIRCLE 357 ON READER SERVICE CARD

Introducing the new United they stand.



Programs in IBM's Assistant Series are like actors in a play. Alone, each gives an outstanding performance. Together, they've been directed to act well as a troupe. (In the software world, this interaction is called "integration.")

Just as actors can easily perform on different stages, these programs can easily work on different IBM personal computers—from PCjr to larger systems like PC/XT.

How integrated software works.

Want to get your facts and figures in order? Start with IBM Filing Assistant. Then, to print the facts in tabular form, add IBM Reporting Assistant. To write about what you've been working on (and make sure the spelling's accurate), use IBM Writing Assistant—the word processing program. Want to put a chart in the middle of your text? Use IBM Graphing Assistant. It takes data directly from IBM Filing Assistant to turn numbers into pictures. When it's time to think ahead with schedules and forecasts—get IBM Planning Assistant,* the spreadsheet program.

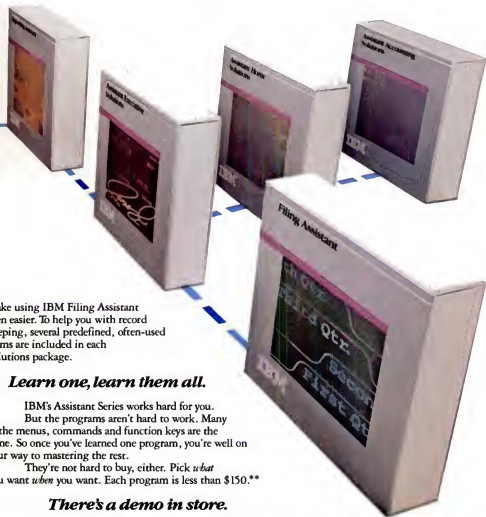
The finishing touch? IBM Assistant Solutions. They

Little Tramp character licensed by Bubbles Inc., S.A.

* Available early next year

** Prices apply at IBM Product Centers

IBM Assistant Series. Divided they stand.



make using IBM Filing Assistant even easier. To help you with record keeping, several predefined, often-used forms are included in each Solutions package.

Learn one, learn them all.

IBM's Assistant Series works hard for you.

But the programs aren't hard to work. Many of the menus, commands and function keys are the same. So once you've learned one program, you're well on your way to mastering the rest.

They're not hard to buy, either. Pick *what* you want *when* you want. Each program is less than \$150.**

There's a demo in store.

We've shown you how affordable the new IBM Assistant Series is. But we can't show you how easy. Your dealer can. Simply ask for a demonstration. For the authorized IBM Personal Computer dealer or IBM Product Center near you, call 800-447-4700. In Alaska or Hawaii, 800-447-0890.

IBM®

Personal Computer Software

UNSURPASSED



BROTHER has done it again. Not content to ride on the phenomenal success of the HR-1, Brother now brings you the HR-25. A machine so improved and technically advanced, with a price/performance ratio that sets it apart in a class by itself.

Although the HR-25 has been designed to fulfill the demands of the high volume user, its price is affordable for even the smallest business groups. And the HR-25 will assure you the highest letter-quality printing at speeds of 23 cps, making it the fastest printer in its price range on the market today.

The BROTHER HR-25 is unsurpassed in every respect, and is backed by the DYNAX reputation for quality and service response.

Options Available: Tractor Feed, Auto Cut Sheet Feeder

CIRCLE 208 ON READER SERVICE CARD

Dynax, Inc.

6070 Rickenbacker Road
City of Commerce, CA 90040
(213) 727-1227

brother. HR-25 ■ from the manufacturers of "OFFICIAL TYPEWRITER OF THE LOS ANGELES 1984 OLYMPIC GAMES"

AST brings you the perfect 4-5-6 for your Lotus™ 1-2-3.



Introducing the MonoGraphPlus™ Graphics Card.

Lotus 1-2-3™ is probably the most-used productivity software around. The trouble is, you can't display 1-2-3 graphs on your IBM monochrome display.

That's why AST developed MonoGraphPlus™ for the IBM PC and XT. It replaces IBM's monochrome card, permitting high-resolution bit-mapped graphics and text on the monochrome display.

But our MonoGraphPlus gives you much more. While Lotus offers three useful programs (1-2-3) in one software package, MonoGraphPlus gives you three additional hardware features (4-5-6) on a single card: a printer port, a serial port, and a real-time clock-calendar. Our comprehensive documentation will even show you how to get an extra two lines of text on your screen.

So now you can produce high-resolution, flicker-free graphics without giving up the high-quality text display that

makes IBM's green monitor so popular. You can also expand your PC's memory with our MP series of memory cards, turning your PC into an even more powerful workstation capable of producing very large spreadsheets with instant charts and graphs.

Leave it to AST to offer yet another state-of-the-art enhancement product for the PC. You see, we're the world's leading supplier of enhancement products for the IBM PC, offering a complete family of multifunction cards, communications emulators, and local area network products.

To get the perfect 4-5-6 for your PC see your local computer retailer, or contact AST Research Inc., 2121 Alton Ave., Irvine, CA 92714. (714) 863-1333. TWX: 733699ASTR UR

IBM is a trademark of International Business Machines Corp.
Lotus and 1-2-3 are trademarks of Lotus Development Corp.
MonoGraphPlus is a trademark of AST Research, Inc.



RESEARCH INC.

MonoGraphPlus Graphics Card



A few smart reasons to buy our smart modem:

Features	Ven-Tel 1200 PLUS	Hayes
1200 and 300 baud, auto-dial, auto-answer	Yes	Yes
Compatible with "AT" command set	Yes	Yes
Can be used with CROSSTALK-XVI or Smartcom II software	Yes	Yes
Regulated DC power pack for cool, reliable operation	Yes	No
Eight indicator lights to display modem status	Yes	Yes
Speaker to monitor call progress	Yes	Yes
Attractive, compact aluminum case	Yes	Yes
Two built-in phone connectors	Yes	No
Compatible with The Source and Dow Jones News Retrieval	Yes	Yes
Unattended remote test capability	Yes	No
Phone cable included	Yes	Yes
Availability	Now	
Price	\$499	\$699

The Ven-Tel 1200 PLUS offers high speed, reliable telecommunications for your personal computer or terminal. Whether you use information services or transfer data from computer to computer, the Ven-Tel 1200 PLUS is the best product around. Available at leading computer dealers and distributors nationwide.

Also from Ven-Tel: internal modems for the IBM and HP-150 Personal Computers with all of the features of the 1200 PLUS.

You choose. The Ven-Tel 1200 PLUS — the smartest choice in modems.

Ven-Tel Inc.

2342 Walsh Avenue
Santa Clara, CA 95051
(408) 727-5721



We thought about calling it MacSimplex . . . after all it makes your IBM®PC behave like a Macintosh™ and much more . . .

and with over two years in the making, the Simplex Database Management System has features like 32-megabyte virtual memory and the most powerful networked/relational database in the microcomputer industry. Simplex was designed around how you think and the Macintosh way, so that you can use your favorite mouse to handle those mundane tasks like menu selection and data manipulation. And, if you don't have a mouse, you can use our keyboard mouse simulator, MouSim™.

Pop-up and pull-down menus, dialog and alert boxes are not just added features, they are the heart of the Simplex way. In addition, Simplex gives you both a software and a hardware floating point capability, each with 19-digit accuracy. It permits login, password, privilege, and can be used on a local area network. Simplex has full communications and a remote or local printer spooler. Above all, Simplex is modular and grows with you! Simplex also has a full-featured, English-like language which is simple to use.



You can't buy Simplex™, but it is now available as an integral part of
it's my **Business**™ and will be used by it's my **Word**™, it's my **Graphics**™, . . .

Businessmen! It's my **Business** will revolutionize the way that you handle your business. It saves time, money, and standardizes your system for all who use it. It's my **Business** comes with applications like accounting, interoffice or intraoffice mail, editing, invoicing, inventory management, mail list, calendar, scheduler, forms and more. You can modify each of these to create applications specifically designed for you... maybe we should have called it "it's your Business".

Professionals! It's my **Business** has over 200 pages of examples and demonstrations to show you how to solve your everyday professional problems. And if these examples aren't enough, we give you a complimentary one-year subscription to Questalk™, our hands-on Simplex applications magazine.

System integrators and consultants, beware! If you are not using it's my **Business** with Simplex to solve your problems, don't be surprised when more novice programmers solve that complex math, industrial engineering, or business problem faster. We think that you can cut your concept-to-development time by an order of magnitude!

it's my **Business** (includes it's my **Editor**) - \$695.00
it's my **Business** Demo Disk - \$20.00
it's my **Editor** - \$100.00.

Quest Research software is available through your local computer store or through mail order from Quest Software Corporation at (205) 539-6086, 303 Williams Avenue, Huntsville, AL 35801.

Value added resellers and dealers please contact Quest Research, Incorporated at (800) 558-8088, 303 Williams Avenue, Huntsville, AL 35801.

Quest™
Quest Research Inc.

IBM is a registered trademark of International Business Machines. Macintosh is a trademark of Apple Corporation. It's my **Business**, it's my **Word**, it's my **Graphics**, it's my **Editor**, it's my **Home**, it's my **Voice**, it's my **Ear**, it's my **Bookshelf**, Simplex, MouSim, Questalk, and the Quest logo are trademarks of Quest Research, Incorporated.

IRMA^{LINE} does the same for remote IBM PCs, IBM PC XT's, Apple Lisas and DEC Rainbows, among others, with just a local phone call to a nearby 3270 controller.

Both can go to work literally minutes out of the box. Both provide mainframe data access, selection and storage, and data communication back to the mainframe.

Put first things first. Find out more about the DCA first family of 3270 micro/mainframe connections. For information, write DCA, 303 Technology Park, Norcross, Georgia 30092. Phone (404) 448-1400, TLX 261375 DCA ATL. Or call us toll-free (800) 241-IRMA.

dca[®]
Digital Communications Associates, Inc.

CIRCLE 444 ON READER SERVICE CARD

IBM PC and IBM PC XT are trademarks of International Business Machines Corporation. Apple and Lisa are trademarks of Apple Computer, Inc. Rainbow is a trademark of Digital Equipment Corporation.





TEXTRA

\$95

Textra™ word processing

The shortest distance between
your thoughts and the printed word.

Your thoughts come faster than your words. Capturing them smoothly and quickly is the strength of Textra, and the secret behind its success.

Textra blends advanced features with a simplified design that makes it easier to write with your personal computer. And that's what word processing is all about.

Start with the 'on-line' tutorial, which has been called everything from elegant to excellent. It's the finest introduction to a software program ever filmed. You'll be ready to write in record time.

And Textra will be ready for you. Its highly responsive full screen editor helps you put your thoughts on the screen swiftly. Automatic reformatting and on-screen bolding and underlining show you what your printed text will look like at all times. You can even preview your pages *before* they're printed, so you only have to print them once!

Whether you're searching for your first word processor, or feel miserable with the one you have now, take a close look at Textra. Ask your dealer for a demonstration today.

It's guaranteed to open your eye.

Ann Arbor Software

407 N. Main, Ann Arbor, MI 48104 Phone (313) 769-9088
© 1983, Ann Arbor Software. All rights reserved.

CIRCLE 117 ON READER SERVICE CARD

Runs from the IBM PC, and compatibles, and
requires PC DOS (any version) 2.00K, and other
software

UHN News

FROM THE EDITORS OF PC

AUGUST 21, 1984

AT&T to IBM: 'Watch Us'

With Olivetti-built PC 6300, AT&T technically bests IBM PC, announces \$100 UNIX switch program and twisted pair network for big organization users

BY BILL MACHRONE

NEW YORK—"Watson, watch us now."

That's AT&T's new slogan, reflecting its emergent market-conscious corporate profile. It was emblazoned in yard-high

Graham Bell's legendary assistant or to IBM's founding Watson family.

The AT&T PC 6300 is not just a me-too clone. It is a serious contender for the most-

is designed and built by Olivetti. AT&T owns 25 percent of Olivetti, a marriage that appears to be bearing fruit.

High Noon

The heart of the AT&T machine is an 8-MHz 8086, giving it performance that Charles Marshall, chairman of AT&T Information Systems, calls "50 to 80 percent faster than the IBM PC." Unlike IBM, which offers the PC and PC Portable without standard I/O facilities, the AT&T machine sports a serial port, a parallel port, a

clock/calendar, and hi-res monochrome graphics as part of its basic package. Marshall invited the audience to compare the machines side by side, an exercise he referred to as "electronic High Noon."

An AT&T machine with a hard disk, one floppy, 256K RAM, and the standard I/O described above, lists for \$4,985. A similarly equipped PC-XT costs \$4,845.

After the press briefing here recently, AT&T had a formal technical presentation of the (continued)



letters over the heads of the AT&T Information Systems officials who introduced the company's long-awaited personal computer.

After looking at the machine, you have to wonder whether the phrase refers to Alexander

computable title, and it bests the IBM PC in speed, graphics performance, and standard features. Further, it does so at a price that will make computing America sit up and take notice.

Tuned by AT&T for the American market, the machine

Are Good Looks Enough Today?

Enable is integrated package with that little extra something—for everyone

BY CONNIE WINKLER

BALLSTON LAKE, N.Y.—Can a nifty product from an unsung developer make it in today's high-stakes market for integrated software (the \$695 genre) packages?

With *Enable*, The Software Group, in this off-the-beaten-path community, is taking a shot at the market now seemingly

dominated by *Framework* and *Symphony*. *Enable*, which is expected in September, has it all: word processing, spreadsheet, graphics, database, communications, and up to eight windows.

What's neat is the touches: Files from *WordStar* (or 1-2-3 or (continued)

AT&T (continued)

machine's innards and architecture. For the tire kickers, they also had a roomful of PC 6300s running popular software.

A quick tour of the machine reveals a tilt-and-swivel 13-inch monitor sporting a unique and attractive character set. The low-persistence phosphor display shows none of the blur common to IBM's monochrome monitor, and it exhibits no discernible flicker.

There are seven expansion slots available inside, six for the hard disk machine. The keyboard, lamentably, has the same layout as the IBM PC. Like Compaq, AT&T was forced into this position by the preponderance of existing program documentation depicting the IBM layout. The keyboard has LED indicators on the Caps Lock, Num Lock, and Scroll

Lock keys. The keyboard's touch is lighter than IBM's, but not as light as a KeyTronic board's. There is an audible and tactile click on the downstroke, while IBM's upstroke "unclick" is mercifully absent.

A large, low-speed fan on the back of the case moves plenty of air while keeping the noise level acceptably low.

AT&T has clearly done its software homework, too. At the presentation, in addition to MS-DOS and Concurrent CP/M, its machines were running Ashton-Tate's *Framework*, Microsoft's *Flight Simulator*, and other popular programs. Further, the machines were attended by high-level individuals from the software companies, a significant show of support for the new PC. (The press kit contained a long list of programs that had already been tested on the

AT&T PC.) In keeping with Future Computing's "functionally compatible" rating of the PC 6300 (the highest), the list included bestsellers in virtually every category.

A UNIX Future?

One oft-asked (and determinedly unanswered) question was the possibility of a single-user UNIX 5.2 implementation for the new machine. AT&T officials maintained that MS-DOS was the right operating system for the machine, but did not disallow the possibility of UNIX in the future.

The other announcements that accompanied the unveiling of the PC made UNIX all the more likely. The offerings included a new network for high-end users, and UNIX application software for the 3B series of minicomputers, including *Mul-*

tiplan, Microsoft's *Word*, and a variety of database managers. A \$100 context-switching program for the PC 6300 flips the machine from MS-DOS mode to UNIX remote terminal mode at a keypress.

AT&T has done its homework in the distribution area as well. The machine is available immediately through Computerland, Sears Business System Centers, the Genra Group, CompuShop, and AmeriSource, with others to follow. The AT&T national account sales force will, of course, handle the machine, but it is unlikely that the machine will appear in AT&T's own stores in the foreseeable future. AT&T officials are sensitive to IBM's apparent willingness to abandon retailers in favor of its own Product Centers. They are determined not to do the same. ■

Enable's Looks (continued)

VolksWriter or several other popular programs) can be dumped directly into *Enable* documents, with codes automatically removed. And *Enable* is as smooth (seamless, in today's jargon) as any integrated package *PC Magazine's* editors have seen: A chart can be integrated (truly) into a text file and print simultaneously.

The user can edit graphic images after they've been merged into text, and can manipulate the text as though it were a graphic image. Spreadsheets, likewise, can be combined with other types of data into a seamless whole.

Like *Framework*, *Enable* makes the IBM PC look good. It's packed into 192K—and it's fast. "Lightning fast" is how micro software maven Esther Dyson, who previewed the product, described it.

But, is fast enough? *Enable's* odds are "not all that great, simply because of marketing—that's what the market is all about these days," says Dyson, who publishes *RElease 1.0*, a newsletter, in New York.

Television Battles

Major sophisticated integrated products, such as *Framework* from Ashton-Tate and *Symphony* from Lotus Develop-

ment, are being promoted with multimillion dollar (reportedly \$8 million for *Framework*) advertising budgets, including television time. These products are going into large corporations, Dyson noted, and it is precisely these buyers who are

sion advertising from the big guys will educate and butter up less-sophisticated users.

That's not to say that The Software Group won't advertise—they're readying a print campaign. And they have 10 sales people—out of 45 em-



most concerned with the issue of third-party support. They're more comfortable doing business with the name software vendors.

Of course, *Enable's* marketing team is underdressed. The big advertising budgets are "artificial barriers," counters Laura Hoffman, vice president of marketing for The Software Group. The Software Group rationalizes its competitors' big budgets to its own advantage: The televi-

ployees—visiting dealers.

Control Layer

The Software Group also rhapsodizes about *Enable's* structure and code, especially the Master Control Module (MCM), the layer on top of DOS, which supervises the applications. The MCM—not unlike IBM's mainframe CICS systems—takes over many functions of the operating system, Hoffman said.

To attract those users, the company is offering extraordinarily attractive deals—discounts of 66 percent—to dealers. And, the company is getting users involved in advisory boards.

The Software Group is headed by Ronald P. Quake, one of the entrepreneurs behind Bibliographic Retrieval Services (BRS), a highly successful international on-line information utility for bibliographic searches. Some of the proceeds of the sale of BRS to Thyssen-Bornemisza, Inc., an international conglomerate, were used to launch the Software Group.

Ironically, notes Hoffman, when BRS started in 1976, it jumped into a market dominated by heavily-funded, heavily-supported companies, notably Lockheed and Dialog. ■

IBM Brightens 3270 PC With Graphics Capabilities

"We expect significant growth in the use of color," IBM says as it goes after business graphics market

BY BILL MACHRONE

NEW YORK—Tantalizing. That's the word for IBM's latest 3270 PC announcements of color graphic workstations, accessories, and software.

As good as the 3270 PC's original color capabilities are, these new products, the 3270 PC/G and 3270 PC/GX, make them look amateurish. Product development manager John Baiffa said, "We expect significant growth in the use of color." Although these products fall short of full-scale computer-aided design workstations, they fill a gap in IBM's lineup between high-end CAD (Computer-Aided Design) terminals and PC color graphics. These products, with their 14- and 19-inch screens, are suitable for some CAD and high-end business graphics. "Our research shows that comprehension and retention are dramatically improved with color," asserted Baiffa.

The 3270 PC/G is suitable for general-purpose engineering and business graphics. Its 14-inch screen can display up to eight colors in a 720-by-512 matrix, with as many as 3,920 characters on-screen.

The screen is managed not by the 3270 PC, but by a "display attachment unit" that provides local graphics processing, color fill, PC color-graphics emulation, and a variety of character sets. The pair adds \$4,660 to the price of a 3270 PC.

The 3270 PC/GX sports a 19-inch screen, addressable as 960-by-1000 graphics points, with up to 16 colors available. A 32-bit microprocessor manages graphic display chores. It is noticeably faster than the 14-inch model. The GX packs additional power to do a host of

graphics tricks, such as two- and three-dimensional transforms, translation, scaling, clipping, and rotation. It also emulates good old PC color

the host computer. They further ease its burden by locally managing cursor functions, area and pattern fill.

IBM hasn't ignored the range



graphics. This beauty will set you back a cool \$12,000, not to mention the price of a 3270 PC.

Mouse and Vectors

Both versions store their images as vectors, drastically reducing the storage overhead on

of graphics peripherals, either. There is a mouse (the familiar Mouse Systems optical mouse), a tablet, and a new color ink jet printer. The printer employs drop-on-demand technology, with easily replaceable ink cartridges. It prints in seven colors,

at 37 characters per second in character mode, or 3,100 dots per second in graphics mode. At this speed, a screen dump can take 4 to 6 minutes, but ink jet technology makes it happen in near-total silence.

The printer, dubbed the 3852, can print on roll-fed paper or transparencies. Transparencies are fed by hand. The paper is special, the short-liver variety favored by other ink jet manufacturers to keep the image crisp. The printer will be available for \$900 in September.

These new products are significant in that they fill a gap between the 3270 PC's graphics and those of a high-end CAD workstation. They further legitimize the 3270 PC, and are careful to retain a PC-DOS environment, as well as the 3270 PC's windowing system.

The 3270 PC has been embraced by MIS departments, more so than by end users. These offerings will help to expand its sphere of influence beyond the DP department and out into the engineering department. The capabilities match or exceed those of many competitive workstations.

Mainframe Connection

On the debit side, there are some gaps in the product offering and a decided dependence on mainframe processing power. For instance, the GX version can display halftones, but they must be read into a mainframe running DISOSS with an IBM Scanmaster I document scanner. Similarly, almost any text editor that runs under PC-DOS can be used to get characters into the system, but there is no specific software that allows page composition. Nor does IBM have a reproduction-quality printing system (as yet) compatible with this product. The engineers appear to be stymied by the lack of standards for driving phototypesetting equipment.

While these new 3270 PC products are not exactly in the "affordable" category for many personal computer users, they will be welcomed by many businesses. Further, they clearly indicate where personal computer color graphics is going. ■

Speaking of Computers: Macs Are Selling Fast

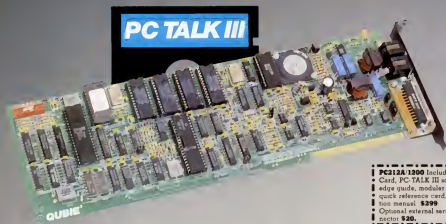
"We reached our 50,000 unit sales goal in just 74 days. By comparison, it took 2½ years to sell 50,000 Apple IIs, and 7 months to sell the same number of IBM PCs. Consumer demand for Macintosh during the first 100 days was at least double the 70,000 units that we could produce."

Steven P. Jobs, chairman of the board of Apple Computer, Inc., referring to Macintosh Computer sales

Thinking of
buying a

modem? You owe it to yourself to check

Inside



Just a few years ago, computers needed big air-conditioned rooms to operate in, balefuls of money to buy, and a team of wizards to keep them running. The constant march of technological progress has given more and more powerful machines which cost less and less. Desktop computers more powerful than the early mainframe computers are the result of the evolution. The Qubie' modems represent the latest extension of this progress. Because up until now, a 212A compatible modem cost at least \$500. Through the use of four low-cost, state of the art microprocessors, we can now offer two versions of our full featured 212A modem at prices the competition sells 300 baud modems for.

In The Beginning

In September of 1983 we introduced the first 212A

modem card for the IBM PC available for under \$300. The PC212A/1200 is a complete communications package including PC-TALK III software, modular phone cable, card edge guide, and instruction manual. The modem is an auto-dial, auto-answer type, which uses all the Hayes software commands so it can be used with any of the popular software packages including Crosstalk™ and Smartcom™.

We picked the best software package we could find based on it's ease of use and features, PC-TALK III. Our modem includes features the old industry standard missed out on. Like being able to fit in one slot in a Portable PC or PC/XT. Or an optional connector to use the modem's serial port when not using the modem. Of course the topper is the \$299 price, hundreds less than the competition.

PC212A/1200 includes Modem Card, PC-TALK III software, card edge guide, modular phone cable, quick reference card, and instruction manual \$299
Optional external serial port connector \$20.

Our standalone modem, the 212E/1200 can be used with any computer or terminal with a RS-232C serial port. You can use any Hayes compatible communications software on anything from an Apple to a Zenith. Many owners of IBM PC's are using it because they lack available expansion slots, or have more than one computer they want to use their modem with.

It's attractive gold anodized case houses seven status lights (who says low prices means a shortage of features). It fits comfortably under a standard telephone. It is also a 212A compatible auto-dial, auto-answer modem which supports all Hayes software commands. Even the switch settings are the same, so any software giving recommended switch settings for a Hayes modem can be used, without knowing

Outside

out the Qubie' 212A modems.

212E/1200 Includes: Standalone modem with cable (specify male or female), modular phone cable, and instruction manual. \$329.



what the switches do. There is a volume control knob for easy adjustment of the speaker's output. Included in the package is modular phone cable, a cable to hook it to your computer or terminal, and instruction manual. Choose the communications package right for your needs, and you're ready to go!

Four Hearts

The heart of the Qubie' modems are four digital signal microprocessors. Two handle sending, and two do the receiving. Rather than attempt to filter all but the relevant tones used for modem communications, the microprocessors measure the tones digitally. This allows them to overcome line noise and static better than analog filter based modems.

Why Buy From Qubie'

Because you will get a prod-

uct as good or better than any available, pay less for it, and get factory direct help if you need it. If at any time during the one year warranty period your modem should require service, we will fix it or replace it within 48 hours. Notice also there are no hidden charges in our prices. No extra for freight, insurance, credit cards, or COD fees. In a hurry? UPS 2nd day air service is just \$5 extra. If you are like many who say, "Nah, it's too good to be true," just apply the acid test and find out. Then you will be asking yourself, "Why should I pay what these modems used to cost?"

The Acid Test

Qubie' gives you a 30 day satisfaction guarantee on your modem. If you are not completely satisfied we will refund the entire amount of your purchase including the postage to

return it. If you can, get anyone selling another modem to give you the same guarantee. Buy both, and return the one you don't like. We know which one you will keep.

IBM is a trademark of International Business Machines Corporation. Cerebral is a registered trademark of Microsoft Inc. PC Tele II is a registered trademark of The Headlands Press Inc.

Order Today, Shipped Tomorrow!

All prices include UPS surface freight and insurance. Add \$5 for two day air service. For fastest delivery send certified check or credit card. Personal checks take 18 days to clear. Calif. residents add 6% sales tax. Corporations and Institutions call for purchase order details.

(800) 821-4479

Toll Free Outside California

(805) 987-9741

Inside California

QUBIE'

4809 Calle Alto
Camarillo, Ca. 93010

Tempo House, 15 Falcon Road,
London SW11 2PH, United Kingdom

© Copyright Qubie' 1984



Īn'tə-grāt

To Harmonize
To Blend
To Orchestrate
To Unify

THE Software INTEGRATING System to Make IBM PC™* Programs Work Together

LOIS makes independent software packages work together to create customized work stations.**

It's a single open-ended software package integrating multiple independent programs such as WordStar™, dBaseII™ and Lotus 1-2-3™ with one simple interface and one simple command structure.***

A touch of the key enables the user to transfer data from one software package to another, or to move from one program to another.

LOIS is the master INTEGRATOR

There is no "lock-in" to a particular software product line. With the LOIS Work Station the user can select favorite programs for integration. They can be selected off-the-shelf or from the user's library of custom programs.

Add-ons are easy and virtually limitless. The LOIS Work Station integrates them all.

LOIS is flexible.

It allows you to sell more software because customers keep coming back. It adds value to the user's present programs. It adds functionality and productivity.

LOIS is available now!

For more information call 1-800-223-6250, or 801-264-2050.

ModTech International

5251 South Green Street
Suite 100
Salt Lake City, UT 84123

LOIS is another quality product from ModTech International

*IBM PC is a trademark of International Business Machines, Inc.
**LOIS is a trade mark of Lytron Systems, Inc.

***WordStar is a trademark of MicroPro, Inc., dBaseII is a trademark of Ashton-Tate, Lotus 1-2-3 is a trademark of Lotus Development Corp.

Communications Is the Operative, Multi-layered Word at Regional PC Expo

'Coming soon to an exhibition hall near you'

BY MARTIN PORTER

NEW YORK—Communications was the name of the game at PC Expo here, another in the growing number of regional—and apparently successful—trade shows.

It was an opportunity for 250 vendors to flaunt new products—before the chaos of the big National Computer Conference (NCC) in Las Vegas—and to communicate with large purchasers, especially from the area's Fortune 1000 companies.

An emerging emphasis on micro-to-mainframe links was a common theme in the seminar presentations and three floors of displays. Cipherlink Corporation of Los Angeles, California, for instance, introduced what it called a "universal solution" to communication problems between incompatible computer systems and computer programs. The system acts like a software translator between two incompatible machines and eliminates rekeying to organize and use data from several incompatible sources. Cipherlink's "databridge" does not require the modification of either the source or the target computer.

Meanwhile, Information Builders took the opportunity to announce new OEM agreements with Texas Instruments and Wang for the use of its *PC/FOCUS LINK* software, which allows PC users to upload and download information to and from mainframes. The company had announced a similar product for the IBM PC last year. It also introduced *FOCTALK*, which allows an ordinary IBM PC, configured with only 256K and no hard disk, to make the mainframe connection.

Other micro-to-mainframe products on display included

Techland Systems' addition to its BlueLynx family of terminal emulators. The company announced an exclusive OEM agreement with IBM for a customized version of the 122 key, model 1A IBM keyboard subassembly. With the BlueLynx hardware/software combination, users can turn their PCs into mainframe terminals.

The demand for micro-to-mainframe capabilities may also affect the new generation of integrated software, it now appears. Cullinet made the New York announcement of its *Goldengate* integrated software package. Unlike Ashton-Tate's *Framework* or Lotus Development's *Symphony*, *Goldengate* is designed to work with a mainframe database product, Cullinet's own IDMS. In addition to mainframe communications, *Goldengate* includes a spreadsheet, document processor, local relational database, full-color business graphics, and a file manager.

Local Area Networks

The other hot topic in PC communications, local area networks (LANs), was well-represented by mainstay manufacturers like 3Com, Novell, Quadram, and Ungermann-Bass, though most product introductions had already occurred earlier at COMDEX in Atlanta. On the other hand, integrated software maintained a surprisingly low profile: Ashton-Tate exhibited *Framework* in a scaled-down booth and Lotus Development did not attend at all.

However, a start-up concern, ModTech International of Salt Lake City, was hoping to put a new wrinkle in the high-end software development with *LOIS*, software that can inte-

grate already-popular and competing software products such as Lotus' 1-2-3, *WordStar*, and *dBASE II*. The program, which takes up only 4K of internal memory, automates file transfer between these programs and allows users to adapt their existing software library to the in-vogue "integrated" scheme.

In hardware, Quintar of Torrance, California, introduced a standalone graphics controller that can produce a 832-by-630 resolution picture with a PC. Upland Technologies displayed a compact 67-megabyte storage subsystem that makes a tape drive work like any other disk drive, using DOS version 2.0 commands.

More on Boards

And although its name may not be well known to consumers, Furaday Electronics of Sunnyvale, California, which earlier this month signed an OEM agreement with NCR Corporation for the use of its PC-DOS compatible products, made one of the more extensive

hardware announcements on the exhibition floor. Its PC Expo introductions included the FE 6420 series of IBM PC compatible single boards, the third in a series of standard format CPUs for the OEM market; a reduced-size floppy disk controller (Model 5141); and an integrated monochrome display adapter (FE 5200).

Why make product introductions at all at this relatively small regional trade show? Information Builders national sales manager (OEM) Peter Balestino voiced the consensus opinion: "The main reason is for Fortune 1000 exposure. You need a New York show to reach those buyers."

However, the show management thinks there is room for PC Expos outside the New York metropolitan area. In fact, show officials indicated that the formula will again be tested in Anaheim, California, September 24-26, as well as in Chicago, December 10-12. Coming soon this year to an exhibition hall near you...

Borland's Turbo Pascal 'Selling Like Hotcakes'

SCOTTS VALLEY, Calif.—Programming in Pascal has gotten a boost with the popularity of Borland International's \$49.95 Turbo Pascal compiler, according to the firm's marketing and sales vice president Alex Morton. In the product's first 5 months, 30,000 copies were sold.

"We believe software is overpriced. Pascal is a powerful language; we wanted to make it available to everyone," Morton said. IBM's Pascal is \$300; and Pascal MT + from Digital Research in Pacific Grove, Calif., is \$600.

What attracts users to Turbo Pascal, aside from the low price, is the integrated editor that eliminates cumbersome separation of text editor and compiler, a problem in most other compilers, Morton says. The unification of editor and compiler is particularly impor-

tant in debugging when the user must swing back and forth between text editor and compiler. During debugging, Turbo Pascal displays the source code for the new program and automatically points to the error.

"We made Pascal accessible to programmers, university students, and beginners," Morton claims, adding that the menu-driven aspect makes Turbo Pascal even easier to use. And, touts Morton, his program is "up to 97 times faster" than other compilers, thus the "Turbo" designation.

Version 2.0, out since May, adds windows, color, sound, and graphics support to Version 1.0. Updates are \$29.95. A program supporting Intel's 8087 math microprocessor is \$89.95. Turbo Pascal requires only 33K and runs on the PCjr as well as on the IBM PC. ■

Calling Micro Mart™ Can Be Music To Your Ears

Micro Mart is more than mail order. We are a multi-million dollar production, orchestrating your favorite PC hardware and software at superb discounts—all accompanied by great service and technical support.

Find out what our biggest critics (our Fortune 500 accounts) already know. Our selection is above measure. Each of our consultants are virtuosos in personal productivity and our discount savings will tickle your ivories.

We're playing your tune in the heart of distribution, not just fiddling about "the Old Mill Stream." So check out the score of state-of-the-art PC products in the rear of this magazine and give us a ring. Ask for expert advice and your best price.



Also Appearing Daily In:

Atlanta • Charlotte
Washington DC • Tampa
Louisville • Showrooms

Coming Soon To:
Ft. Lauderdale • Orlando
New Orleans

Micro Mart Computer Centers

See our 2-Page Ad In Rear of Magazine

America's PC Specialists

MICRO MART™

Technology Corporate Campus
3159 Campus Drive • Norcross, GA 30071

Orders Only 1-800-241-8149
For Information 1-404-449-8089

**Show Our Ads To Your
Purchasing Agent**



Maestro: Chris Hodges, Micro Mart's VP of Sales, 9 years experience.

Micro Mart is a registered trademark of Micro Mart, Inc.

IBM Clears the Air

Dear PC Magazine:

You recently reported on problems I was having with radio frequency interference causing spurious input from my keyboard (see "PCs Key In On Radio Signals" and "Running Interference," *PC*, Volume 3 Number 9, page 33). My father, with whom I live, is a ham radio operator, and his station, with all the legal and optional protection available, was still generating spurious characters on or outright crashing my IBM PC. I was finally driven to purchase a Keytronic 5150 keyboard, whereupon the problems abruptly stopped. I complained to IBM Customer Relations in Boca Raton, but the only response was: "Our product is FCC-approved."

Shortly after the *PC* coverage, I received a mysterious call from an IBM employee who would identify himself only as "Jack." He was a ham radio operator and PC owner who, like many I had talked with on CompuServe, had suffered the same problem.

He pointed out that the PC is susceptible not only to inputting but also to emitting RFI, especially in the 21 to 28 MHz band. He said this was inherent in the old 64K maximum motherboard and had been eliminated from the new 256K or XT motherboard, which began appearing around March 1983 when I bought my system. He also told me that the new keyboards introduced with the XT board have a "toroid," an RFI choking device, in the cable connector.

Jack advised: "IBM simply will not address the input situation. Go to them with the emission problem. Anxious to comply with FCC emissions standards, they'll give you a new motherboard and toroid-equipped keyboard, which will, coincidentally I'm sure, put an end to your input problem." Jack told me to write directly to Don Estridge (the man who led the PC development team). "He won't stomach any nonsense."

It was worth a try, so I did, and enclosed a copy of my letter to PC. Sure enough, a few weeks later I got a call from IBM Customer Relations: IBM will not accept responsibility for the susceptibility of the keyboard, but it is interested in happy customers and reduced RFI emissions. A service person will call.

On June 5, a service representative came out and systematically replaced the old motherboard with a new one of the same design, then replaced the power supply, and finally replaced the old-style motherboard with a 256K-capacity XT model. After the XT board went in, my ham operator, monitoring downstairs, noted a marked decrease in broadcast noise from "WIBM" (as my "station" is not-so-affectionately known). In the installation process, my A: drive somehow jammed and was forthwith replaced. The upshot was that I received one new XT motherboard with convenient new memory

capability, one new power supply and fan, one new disk drive—and no charge. I was impressed.

My old IBM keyboard was withdrawn from the closet and proved much less RF-susceptible working with the new motherboard. After some testing, though, it finally crashed *Volkswriter Deluxe*, generating a few spurious characters that looked like comic strip expletives as it went down. As promised earlier, my nearby ComputerLand, which had been a helpful intermediary all along, promptly provided a new, toroid-equipped keyboard.

Input susceptibility was even further reduced. But the new keyboard/motherboard combo is still susceptible to crashes when a nearby transmitter is run at 500 watts, on 40 and 75-80 meters; above this power, the computer goes absolutely bonkers. (For hams, the legal limit is 1,000 watts.) I have found that even the Keytronic, when assaulted by 500 watts at 40 meters, generates a few spurious characters, though it will not crash. Further, unlike the IBM, the Keytronic emits spurious RFI at only one place along the band: 3.555 MHz. The Keytronic is still less of an RFI producer than the toroid-equipped IBM keyboard, and a less-receptive antenna for external radio signals.

Even though my IBM keyboard is now back in the closet, I want to express my sincere appreciation for IBM's persistence in helping to alleviate, if not wholly solve, my problem.

Sincerely,
Travis Chabneau
Williamshurg, Virginia

You Never Can Be Too Obvious

El CAMINO, Calif.—Cdex Corp., a publisher of disk-based PC tutorials, recently realized that the vast majority of PCs had double-sided disk drives, so it was safe for Cdex to switch its products from single- to double-sided disks. A small change in deed, but one that Cdex's promotion staff wasn't about to let pass unnoticed.

Emblazoned on every Cdex box and disk jacket are new stickers announcing: "Now on Double-Sided Diskettes."

Then, in a further fit of marketing inspiration, Cdex declares, "Also Runs On Popular Half-Heights."

Since a half-height disk drive is merely a drive with the same electronics in a smaller package, any 5¼-inch floppy can run in it—the slot's still the same size, after all. In any case, it never hurts an advertiser to point out the obvious with flair.

If this approach sells disks, however, we soon might see ads like, "Culture Club on C-90 cassettes—Also Runs on Popular Sony Walkmans."

—William K. Howard

My Word! A Four-star Performance

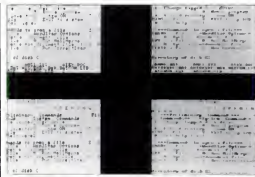
Old hands at *WordStar* are no longer shocked at finding new features in this program that aren't hinted at in its menus—or even in its documentation. But what would they make of this: an unretouched shot of *WordStar* split into four screen areas—all of them active! From this main menu you can start editing a document and have the cursor and your text appear in all four sections. Even though MicroPro has pooh-poohed the usefulness of multiple screens, does the manufacturer have some

windows in its closet?

Well, no. The screen here, which appeared on an IBM color monitor, was produced by setting 40-column mode before loading *WordStar*. (From the DOS prompt, enter MODE CO40.)

We don't expect this kaledoscopic feature will make *WordStar* any more effective, but you might have fun slipping this effect into an AUTOEXEC.BAT file on a coworker's program disk.

—James Langdell



WordStar got windows? Keep looking.

CompuCable provides: "Tomorrow's Connections... TODAY!"

CompuCable Corporation is a pioneer in the manufacture of innovative interface cable assemblies. We begin with the finest materials available and assemble them to please the most discriminating customer. Our cable assemblies feature:

- EMI / RFI fully shielded interlocking hoods
- gold at point of contact
- heat shrink tubing at points of connection and exit
- stranded copper inner conductors with PVC jackets
- tough PVC outer cable jacket
- over 800 cable configurations are currently available and ready for shipment, and
- we manufacture custom configurations.

We are also your single source



connection for microcomputer products and accessories like:

- IBM® PC visual enhancement screens for color and monochrome monitors
- IBM PC disk drive and keyboard dust cover sets
- interface and memory boards for most popular computers
- and data transfer switches.

Contact the CompuCable sales and warehousing office nearest you to get the whole story.

We're committed to being your single source connection for microcomputer product and accessories today...and tomorrow!



COMPUCABLE CORPORATION

Tomorrow's connections...today!

ALASKA & HAWAII

800/521-7903
714/635-7330

ANAHEIM, CA

800/521-7903
714/635-7330

DALLAS, TX

800/527-2311
214/960-2311

CANADIAN & EUROPEAN REPRESENTATIVES

LAUREL, MD 301/621-1800

LAUREL, MD

301/638-9140
301/621-1800

■ FUTURE OFFICES

IBM IS A TRADEMARK OF INTERNATIONAL BUSINESS MACHINES
© 1986, COMPUCABLE CORPORATION

Something Totally New in Applications Software From Borland,
The Folks Who Make Turbo Pascal.®

SIDEKICK

**ALWAYS
JUST A KEYSTROKE AWAY . . .**



"SOMETHING TO RELIEVE THIS MESS!"

If you've ever found yourself searching for a calculator or a notepad when you've got a computer right in front of you, then you know why we came up with Sidekick®.

**WHETHER YOU'RE RUNNING
1-2-3, WORDSTAR,
dBASEIII OR WHATEVER . . .**

**JUST A KEYSTROKE
AND A SIDEKICK
WINDOW OPENS . . .**

- A CALCULATOR
- A NOTEPAD
- AN APPOINTMENT
CALENDAR
- AN AUTO DIALER
- AN ASCII TABLE
- AND MUCH MORE

**ALL AT ONCE . . . OR ONE AT
A TIME. ANYWHERE ON
THE SCREEN YOU LIKE.**

**ANOTHER KEYSTROKE,
AND YOU'RE RIGHT
WHERE YOU LEFT OFF
IN YOUR ORIGINAL
PROGRAM!**

(you never really left!)



Something brand new. Crafted in Assembly language as carefully as Borland's famous Turbo Pascal®, so that it's lightning fast and as compact as only Borland knows how to make it! With a notepad that has a full-screen editor that saves your notes to disk. You can even swap information back and forth between your applications software and your Sidekick®.

Suppose you're working with a spreadsheet, and you suddenly have an important idea. Just hit the button, a window opens, you write the note and hit the button again. You're right back where you left off in the spreadsheet.



SIDEKICK

INTRODUCTORY OFFER

\$49.95

Available only for the IBM PC, XT, and compatibles.

Need to make a phone call? Whether the number is in an existing database, your own Sidekick phone directory, or you've just typed it on the screen . . . put the cursor next to the number, hit the keystroke, and Sidekick dials for you!

There's lots more, too. You can move the Sidekick windows anywhere on the screen you like. And you can have as many on screen at a time as you need.

We designed it because we needed it. If you've ever been writing a report and needed to do a quick calculation, or jot down a note, then you understand why.

*Only with Hayes Smartmodem and compatibles.

YOU CAN ORDER YOUR COPY OF SIDEKICK® TODAY!

For Visa and MasterCard orders call Toll Free **1-800-227-2400 ext 953** in California **1-800-772-2666 ext 953**
(lines open 24 hours, 7 days a week) Dealer and Distributor Inquiries Welcome 408-438-8400

SIDEKICK® \$49.95

(plus \$5.00 shipping and handling
• Shipped UPS)

Check ☐ Money Order ☐
VISA ☐ MasterCard ☐

Card # _____
Expiration Date _____

Please be sure your computer is an IBM PC, XT, jr., or true compatible!

NAME _____

ADDRESS _____

CITY/STATE/ZIP _____

TELEPHONE _____

California residents add 6% sales tax. Outside U.S.A. add \$15.00 (if outside of U.S.A. payment must be by bank draft payable in the U.S. and in U.S. dollars.) Sorry, no C.O.D. or Purchase Orders.

SD7

BORLAND
INTERNATIONAL

Borland International
4113 Scotts Valley Drive
Scotts Valley, California 95066
TELEX 172373

Don't buy a spreadsheet

A lot of electronic spreadsheets just can't cover your needs. They don't go far enough.

They're unable to work like you or adapt to the way you think.

Time for Microsoft® Multiplan®, the high energy spread. A spreadsheet with more workspace than the other leading spread. Full of high performance capabilities for your IBM® PC, PC XT, PC jr. or other MS™-DOS microcomputer.



Multiplan loves you as you are.

Other spreadsheets force you to learn how they think. Multiplan learns how you think. It remembers the way you work. Anticipates frequent commands. Even offers suggestions on spreadsheet set-up.

Commands are in English. So are formulas. Instead of typing mysterious coordinates like H54-L73=BK154, you can simply name worksheet areas: Sales - Costs = Profit.

that spreads too thin.

Multiplan can link information in different spreadsheets. When you make a change on one, every related one is changed.

Multiplan has optional Multiplan Application Programs that work with you to design and build custom spreadsheets for Budget Analysis, Financial Statement Analysis or Cash Planning in minutes. Not hours. Or days.

The trained mouse.

Multiplan has an optional Mouse. A handy little critter that flies through Multiplan so easily you barely have to lift a finger to select and execute commands. Small wonder Microsoft gets more performance out of a spreadsheet. We designed **MICROSOFT** the MS-DOS operating system that tells the IBM PC how to think. The High Performance Software that tells the IBM PC how to think. And our BASIC is the language spoken by nine out of ten microcomputers worldwide.

To get the best spread call 800-426-9400 (in Washington State call 206-828-8088) for the name of your nearest Microsoft dealer. Now featuring Multiplan at a reduced price: **\$195.**

Suggested list price shown for Multiplan



Microsoft and Multiplan are registered trademarks and MS is a trademark of Microsoft Corporation
IBM is a registered trademark of International Business Machines Corporation

Perfect Compatibility

IBM & ACP

When you need competitive prices, prompt service and complete support, call us.

HARDWARE SPECIALS

CONTROL DATA

Full Size 320K DS/DD \$ 209*

*"The drive IBM trusted with its logo"

TEAC

Half-Height 320K DS/DD \$ 179

"The #1 Rated Half-Height Drive"

AST MEAGAPLUS II w/256K \$ 434

64K RAM Chips 200ns Pre-Tested \$ 55

AST SIXPACK w/384K \$ 569

MAYNARD ELECTRONICS

10MB HARD DISK

(XT Lookalike) \$ 995

SOFTWARE SPECIALS

LOTUS 1-2-3/WORDSTAR

PROPACK \$ 679

LOTUS 1-2-3/HERCULES

GRAPHICS CARD \$ 679

MULTIMATE w/80K Word Speller . \$ 295

An advanced word processor with all the features of a dedicated stand alone system.

dBASE II/QUICKCODE/dUTIL \$ 450

dB/COMPILER \$ 450

Neither dBase II nor Run-Time required.
30% less storage, faster execution
assembly language interface

EASYWRITER II/SPELLER/MAILER \$ 195

HARDWARE

COMPUTER SYSTEMS

IBM

PC w/256K 2 DS/DD Disk Drives \$ Call

COMPAQ

w/256K 2 DS/DD Disk Drives \$ Call

COMMUNICATION PRODUCTS

HAYES

Smartmodem 300 \$ 209

Smartmodem 1200 \$ 489

Smartmodem 1200B w/Smartcom II . \$ 419

Smartmodem-to-IBM 6 ft. Cable \$ 25

Smartcom II \$ 109

NOVATION

Access 1-2-3 (w/Crosstalk XVI) \$ 379

TAC

Irma (Emulates 3278 Terminal) \$ Call

Irma Line (For Remote Emulation) .. \$ Call

We carry a wide variety of Mainframe Communication and Local Area Networks. For advice about which will suit your needs best give us a call and let us review them with you.

FLOPPY & HARD DISK DRIVES

CONTROL DATA

Full Size 320K DS/DD \$ 209

Half-Height 320K DS/DD w/Bracket . \$ 189

DAWONG

5 MB to 32 MB Hard Disk Int./Ext. . \$ Call
(Includes power supply, controller & software)

TALLGRASS

12-70 MB Hard Disk w/Tape Backup . \$ Call

TEAC

Half-Height 320K DS/DD w/Bracket . \$ 179

Half-Height 640K DS/DD w/Bracket . \$ 265

MAYNARD ELECTRONICS

10MB Hard Disk WS-1 (XT Lookalike) . \$ 995

10MB Hard Disk WS-2 (XT Lookalike) . \$1195

DISKETTES

SCOTCH 3M

DS/DD Box of 10 \$ 35

VERBATIM

DS/DD Box of 10 \$ 35

DISK CONTROLLERS

MAYNARD ELECTRONICS

Standard Disk Controller \$ 115

with Parallel Port \$ 165

with Serial Port \$ 175

Sandstar Modular Disk Controller . \$ 209

All Sandstar Modular Options Avail . \$ Call

EXPANSION BOARDS

MAYNARD ELECTRONICS

Modular Memory Brd. w/64K to 576K \$ 219

Modular Multifunction Board . \$ 95

- Next Day Shipping
- No Credit Card Surcharge
- Company P.O. Accepted

We have built our reputation on offering quality products, prompt service and effective solutions. We understand your need for well-informed people who will work with you to meet your goals. Therefore we have developed a unique approach to sales. Our salespeople are well educated in the computer field and will speak with you not as salespeople, but rather as consultants. They will review your options and suggest alternatives to help you construct a system to best suit both your immediate and future needs. We also have a skilled technical staff that will guide you through any problems you may encounter after receiving your equipment.

HARDWARE CONT.

AST RESEARCH

(All AST boards include SuperDrive, SuperSpool and 1 year warranty)

SixPack Plus w/64K to 384K	\$ 269
MegaPlus II w/64K to 512K	\$ 269
Memory Board II w/64K to 384K	\$ 239
I/O Plus II	\$ 139
MegaPack w/128K or w/256K	\$ Call
Parallel, Serial, Game Options	\$ 35

ORCHIO TECHNOLOGY

Blossom w/64K to 384K	\$ 269
-----------------------	--------

TECMAR

Captain w/64K to 384K w/Software	\$ 269
----------------------------------	--------

QUORAM

Quadboard w/64K to 384K	\$ 279
-------------------------	--------

PRINTERS & PLOTTERS

C. ITOH

Starwriter Letter Quality 40 cps	\$1195
Printmaster Letter Quality 55 cps	\$ Call
Cut Sheet Feeder (Feeds 200 sheets)	\$ 445

EPSON

(All Printers include GRAPHTRAX-Plus)

RX-80 (120 cps, 80 cols)	\$ Call
RX-80 F/T (120 cps, 80 cols)	\$ Call
RX-100 F/T (100 cps, 132 cols)	\$ Call

FX-80 F/T (160 cps, 80 cols)	\$ Call
FX-100 F/T (160 cps, 132 cols)	\$ Call
Epson-IBM Cable	\$ 30
HEWLETT PACKARD	
HP-470A Two Pen Plotter	\$ Call
HP-475 Six Pen Plotter	\$ Call
HP-IBM Cable (works w/Lotus 1-2-3)	\$ 50

NEC

NEC 3550 Letter Quality 35 cps	\$1699
NEC 2050 Letter Quality 18 cps	\$ 895
Bi-Directional Tractor	\$ 235
Cut Sheet Feeder (Feeds 200 Sheets)	\$ 445
NEC-IBM Cable	\$ 30

OKIDATA

Microline 83A (120 cps, 132 cols)	\$ 575
Microline 92 (160 cps, 80 cols)	\$ 445
Microline 93 (160 cps, 132 cols)	\$ 699
Microline 84 (200 cps, 132 cols)	\$ 879
Plug n' Play	\$ Call
Okidata-IBM Cable	\$ 30

SILVER-REED

EXP 550 (20 cps, 132 cols)	\$ 595
----------------------------	--------

MONITORS

AMDEK	
Video 300 Green Screen	\$ 140
Video 300A Amber Screen	\$ Call

Video 310A IBM Monochrome in Amber	\$ 170
------------------------------------	--------

PRINCETON GRAPHICS

HX-12 RGB Hi Resolution Color	\$ 499
Max-12 IBM Monochrome in Amber	\$ Call
SR-12 Hi Resolution Color	\$ Call

VIDEO-MONITOR BOARDS

HERCULES Graphics Card	\$ 359
PC COMPONENTS 8i-Graphic I	\$ Call
PARADISE SYSTEMS Multidisplay	\$ 399
PC+ PRODUCTS Colorplus	\$ 419
STB Graphics Plus	\$ 299
QUORAM Quadcolor I	\$ 199
TECMAR Graphics Master	\$ 499

MISCELLANEOUS

Cables (all extension cables)	\$ Call
8087 Co-processor	\$ 199

KEY TRONIC

Deluxe Keyboard (KB 5151)	\$ Call
KDALA-Touch Tablet w/Software	\$ Call

KRAFT-Joystick

T.G.-Joystick	\$ 49
---------------	-------

MICROSOFT-Mouse w/Software	\$ 159
----------------------------	--------

MOUSE SYSTEMS-PC Mouse	\$ Call
------------------------	---------

SOFTWARE

ALPHA

Database Manager II	\$ 199
Apple-IBM Connection	\$ Call

ASHTON TATE

dBase II	\$ 285
dBase III	\$ Call
Friday	\$ 179
Framework	\$ Call

ATI

All Software Training Pkgs	\$ 55
----------------------------	-------

CENTRAL POINT SOFTWARE

Copy II PC	\$ 35
------------	-------

FOX & GELLER

Quickcode	\$ 169
dGraph (Requires Graphics Card)	\$ Call
dUtil (Utilities For dBase II)	\$ 25
OZ (Management Control)	\$ Call
FINANCIER-Financier II	\$ 119
FUNK-Sideways	\$ 49
HAYES-Smartcom II	\$ 109
IMS1-4 Point Graphics (Rated #1)	\$ 119

INDIVIDUAL SOFTWARE

Tutorial Set (IBM PC/XT and DOS)	\$ 79
Typing Instructor	\$ 49

INFORMATION UNLIMITED SOFTWARE

EasyWriter II System (See Specials)	\$ 195
Accounts Receivable	\$ 299
Accounts Payable	\$ 299
General Ledger	\$ 299
Payroll	\$ 369

INFOCOM-Zork I, II, III	\$ 29
-------------------------	-------

LATTICE

C-Compiler	\$ 299
C-Food Smorgasboard	\$ 110

LIFETREE

VolksWriter	\$ 115
VolksWriter Deluxe w/TextMerge	\$ 179

LIGHTNING SOFTWARE

Master Type (Best Typing Tutor)	\$ 39
---------------------------------	-------

LOTUS DEVELOPMENT

Lotus 1-2-3 (Version 1A)	\$ Call
Symphony	\$ Call
Symphony Upgrade	\$ Call

MICRO DATA BASE SYSTEMS

Knowledgeman	\$ 299
--------------	--------

MICROSOFT

C-Compiler	\$ 349
Flight Simulator	\$ 35
Multipan (New Version)	\$ 149
Multi-Tool Word	\$ 249
Multi-Tool Word w/Mouse	\$ 299
Pascal Compiler	\$ 250

MICROPRO

Wordstar w/Tutorial on Disk	\$ 259
Wordstar/MailMerge/CorrectStar/StarIndex (ProPack)	\$ 369

MICROIM

R-base 4000	\$ 299
Clout	\$ 139

MICROSTUF

Crosstalk XVI (for Hayes Smartmodem)	\$ 109
--------------------------------------	--------

MORGAN COMPUTING

Trace 86 (Assembly Language Debug)	\$ 99
Ted (Program Editor)	\$ 79
Professional Basic (170K Work Space w/8087 Support)	\$ 259

MULTIMATE INTERNATIONAL

Multimate (See Specials)	\$ 295
--------------------------	--------

PETER NORTON

Norton Utilities	\$ 55
------------------	-------

POWER BASE SYSTEMS

Power Base	\$ 269
------------	--------

ROSESOFT

Prokey (Newest Version)	\$ 95
-------------------------	-------

SOFTWARE ARTS

TKISolver	\$ 299
-----------	--------

SOFTWARE PRODUCTS

Open Access	\$ 399
-------------	--------

SATELLITE SOFTWARE INTERNATIONAL

Word Perfect (includes Speller)	\$ 279
---------------------------------	--------

SORCIM

Supercalc 3	\$ 219
-------------	--------

SOFTWARE PUBLISHING

PFS/File	\$ 95
PFS/Graph	\$ 95
PFS/Write	\$ 95
PFS/Report	\$ 79

TALL TREE SYSTEMS

J-Format 2.0	\$ 40
--------------	-------

WORDTECH SYSTEMS

dB/Compiler (True dBase II Compiler)	\$ 450
--------------------------------------	--------

WANG PUBLICATION

Random House Proof Reader 50K speller	\$ 45
---------------------------------------	-------



APPLIED COMPUTER PRODUCTS INC.

1916 Welsh Road #6, Philadelphia, PA 19115

215-934-6990

1-800-223-3860

CIRCLE 139 ON READER SERVICE CARD

Our Policy

We accept VISA, Mastercard, Money Orders, Certified Checks, Cashiers Checks, Personal Checks, Waxed Funds. We do not charge your card until we ship. * No surcharge added on VISA and Mastercard. * Allow one week for personal and company checks to clear. * CDO maximum \$500 Cash or Certified check on delivery. * Please use local phone number for order status inquiries. * Prices subject to change without notice. * Returns may be subject to restocking fee.

SHIPPING (U.S.): For monitors, printers, and hard disk drives add 2% to all orders. Blue label and Next Day Air available. For all other items add \$4. Most orders shipped next day.

In Software we're the *logical* choice!

**LOWEST
PRICE
GUARANTEE**

WE'LL BEAT ANY PRICE
BY \$**10** AND THANK YOU
FOR THE PRIVILEGE

**WE GUARANTEE
48 HOUR
SHIPPING**

WE'LL SHIP YOUR ORDER
WITHIN 48 HOURS or HAVE
a BOX of DISKETTES on us.
THIS OFFER APPLIES TO PHONE ORDERS FOR OUR ADVERTISED ITEMS ONLY
AND WILL BE SHIPPED WITH YOUR ORDER.

**TOLL-FREE
SUPPORT**

LOGICSOFT OFFERS TOLL-FREE, UNLIMITED
TECHNICAL SUPPORT FOR ALL OUR CLIENTS

1-800-645-3491
516-741-0043 (N.Y.S.)

LOGICSOFT

A MEMBER OF THE LOGIC GROUP

LOGICSOFT is a Reg. T.M. of Logisoft, Inc.



Continental U.S.

1-800-645-3491

300 Garden City Plaza,
Garden City, New York 11530

New York State . . . 516-741-0043
Canada . . . 416-283-2354
Int'l. Telex . . . 230199 Swift UR LGS
Dom. Telex . . . 960127 Swift NYK LGS



NO SURCHARGE FOR CREDIT CARDS
Purchase orders accepted by qualified institutions

Add 2% for shipping and handling ☐COD ☐Check ☐Money Order ☐NYS residents add sales tax



TEAR and COMPARE

Use this card to Shop the magazines

SEE REVERSE SIDE FOR ACCOUNTING SYSTEMS

LOGICSOFT

A MEMBER OF THE LOGIC GROUP

LOWEST PRICE GUARANTEE

WE'LL BEAT
ANY PRICE
BY \$ **10** AND
THANK YOU
FOR THE
PRIVILEGE

Tell us the advertiser and price for any IBM-PC software package advertised in a current issue of any popular computer publication and we'll beat that price by \$10. This offer does not apply to those packages whose advertised price is under \$100 or where LOGICSOFT's price is already the lowest!

ALL IN ORIGINAL FACTORY SEALED BOXES

WE
OFFER
OVER
400
OTHER
TITLES

Prices subject to change without notice

LANGUAGES/UTILITIES

Concurrent CP/M86 (Digital Research)	\$225
Pascal MT+ (Digital Research)	\$235
PL/I (Digital Research)	\$479
Display Manager (Digital Research)	\$359
Lattice C Compiler (Lifeboat)	\$299
CIS Cobol 86 (Digital Research)	\$479
Pascal Compiler (Microsoft)	\$245
C Compiler (Microsoft)	\$325
Basic Compiler (Microsoft)	\$245
Cobol Compiler (Microsoft)	\$459
Business Basic (Microsoft)	\$369
Fortran Compiler (Microsoft)	\$245
Prokey 3.0	\$69
Norton Utilities	\$59
Sideways	\$45

WORD PROCESSING

Wordstar	\$235
Wordstar Pro Pak	\$365
Wordperfect	\$295
VolksWriter Deluxe	\$175
MULTIMATE	\$275
Microsoft Word with Mouse	\$289
Peachtext 5000	\$195
Easywriter II/Speller/Mailer	\$425
Samna Word III	\$159
Think Tank	\$85
pls write	\$239
Xywrite II Plus	

INTEGRATED/GRAPHICS

Framework	\$375
Open Access	\$379
Jack 2	\$309
Lotus Symphony	\$435
LOTUS 1-2-3	\$309
Daylio	\$369
Supercalc	\$229
Multipian	\$135
TK/Solver	\$269
BPS Graphics	\$289
Chartman II & IV	\$349
Chartmaster	\$279

DATA BASE/FINANCIAL

R:Base 4000 (Microm)	\$309
KnowledgeMan	\$275
plsfile	\$85
Powerbase	\$375
dBASE III	\$269
TIM IV	\$169
Friday	\$195
Data Base Manager II (Alpha)	\$159
Revelation	\$159
Managing Your Money (Tobias)	\$115
Financier II	\$115
Harvard Project Manager	\$285

CLIP AND SAVE OUR CARD FOR YOUR FILE

VISA

MasterCard

NO SURCHARGE FOR CREDIT CARDS

Purchase orders accepted by qualified institutions.

Add 2% for shipping and handling: C=COO C=Check M=Money Order
NY/NJ residents add sales tax

1-800-645-3491

New York State 516-741-0043 Int'l. Telex 230199 Swift UR LGS
Canada 416-283-2354 Dom. Telex 960127 Swift NYX LGS

LOGICSOFT

A MEMBER OF THE LOGIC GROUP

300 Garden City Plaza, Garden City, NY 11530

Continental U.S.

1-800-645-3491

New York State 516-741-0043
Canada 416-283-2354
Int'l. Telex 230199 Swift UR LGS
Dom. Telex 960127 Swift NYX LGS

©1988 LOGIC Group, Inc. All rights reserved.

Looking for an Accounting System?

CALL US...

WE'VE EVALUATED OVER 50 OF THEM

See our ad in *Journal of Accountancy*

TOLL FREE CONSULT

TOLL FREE SUPPORT

LOWEST PRICE GUARANTEED

INFORMATION UNLIMITED SOFTWARE (IUS)

\$295 Per Module

general ledger
accounts payable
accounts receivable
inventory
order entry

payroll \$359
financial series
(G/L, A/P, A/R) ... \$859

CHAMPION

\$399 Per Module

general ledger
accounts payable
accounts receivable
payroll
inventory control

PEACHTREE SERIES 8

\$375 Per Module

general ledger
accounts payable
accounts receivable
payroll
inventory
sales invoicing
job costing

OPEN SYSTEMS

\$559 Per Module

general ledger
accounts payable
accounts receivable
payroll
inventory
sales order processing
purchase order processing
job costing

REALWORLD (MBSI)

\$575 Per Module

general ledger
accounts payable
accounts receivable
payroll
order entry/inventory

sales analysis \$289

STATE OF THE ART

\$479 Per Module

general ledger
accounts payable
accounts receivable
payroll
inventory
sales invoicing

time keeping & billing \$679

BPI

\$395 Per Module

general ledger
accounts payable
accounts receivable
payroll
inventory
job costing

GREAT PLAINS SOFTWARE

\$479 Per Module

general ledger
accounts payable
accounts receivable
payroll
inventory

TCS

\$1195

client write up

WE CARRY CONTINUOUS FORMS COMPATIBLE TO ALL THE ACCOUNTING SYSTEMS WE SELL



QUANTITY DISCOUNTS AVAILABLE

IMPROVE YOUR OFFICE PRODUCTIVITY
and ENHANCE YOUR COMPANY IMAGE WITH
QUALITY

CONTINUOUS BUSINESS STATIONERY

From your artwork or our stock designs

FREE
BOX OF
10
FLOPPY DISKETTES
(LOGICTRAK DDS 5 1/4" D500 SOFT SECTORED)
WITH INITIAL STATIONERY ORDER

LogicPerf gives you the edge...
stationery that separates easily,
leaving clean sharp edges.



CALL FOR
A **FREE**
STATIONERY KIT
NO COST OR
OBLIGATION

LOGICSOFT

A MEMBER OF THE LOGIC GROUP

We're known by the companies we keep

- ASHTON - TATE
- MICROIM
- DIGITAL RESEARCH
- MICROSOFT
- DOW JONES
- PEACHTREE
- INNOVATIVE SOFTWARE
- SATELLITE SOFTWARE
- IUS
- SOFTWARE ARTS
- FOX and GELLER
- SOFTWARE SYSTEMS
- LIFETREE
- SORCIM
- LOTUS
- AND OVER 100 OTHER PUBLISHERS

- the Logical Choice!

LOGICSOFT

A MEMBER OF THE LOGIC GROUP

LOGICSOFT is a Reg. T.M. of LogicSoft, Inc.

NO SURCHARGE FOR CREDIT CARDS

VISA

MasterCard

Continental U.S.

1-800-645-3491

300 Garden City Plaza, Garden City, NY 11530

New York State 516-741-0043
Canada 416-283-2354
Int'l. Telex 230199 Swift UR LGS
Dom. Telex 960127 Swift NYK LGS

Figuring It Out: IBM's Primer for PC Trainers

BY JAMES LANGDELL

IBM now offers an extensive (384 pages) and inexpensive (\$4.95) book to help instructors who train PC users. *Guide to Learning: Resources for Users of IBM Personal Computers* includes descriptions of about 350 instructional books, software, videotapes, and audio recordings. The guide also suggests how to use these resources in 15 courses involving the PC, and outlines a syllabus for each.

Guide to Learning was developed by IBM and the Human Resources Research Organization. Each listing describes the subject matter covered by the resource and suggests the type and education level of its target audience.



This information is certainly helpful, especially the syllabus section, but the book's organization leaves something to be desired. Information about each resource is split between three sections of the book. The main section lists each item by topic (such as word processing, hard-

ware, or programming languages) then within topics, alphabetically, mixing together books, tapes, training software, and actual applications packages.

These main listings don't include the address or phone numbers of publishers—for that you have to look at another section in the back of the book listing publishers (one list for periodicals, another for everything else). Price information isn't included anywhere.

A third listing section, the Selection Matrix, provides additional information about each item—if you can figure out how to get it from the tables. In 19 pages of charts, each resource is named only by a code, such as COM0060. You have to search back in the main listing section to find what the item actually is—COM0060 turns out to be Volume 1 Number 9 of *PC Magazine*, a theme issue about communications.

The book is designed with

generous amounts of white space in the main section—each page has at most two items. There's enough room that the information scattered in the Selection Matrix and publishers lists could have been consolidated in the main listings of the resources to make the book easier to use.

Little Icons that Can't

The most peculiar things in IBM's *Guide to Learning* are the 18 symbols that are used throughout the book to identify different topics. Unfortunately, the symbols don't have much intuitive connection with the subjects they represent. Several PC staffers tried to match up the symbols with their topics—our best score was only 40 percent. Try it yourself, then look for the inverted answers below.

The *Guide to Learning* can be ordered from IBM Direct, Dept. TT4, 1 Culver Road, Dayton, NJ 08810 for \$4.95 (add \$1 per book for handling). ■

- A. Engineering and Science
- B. Word Processing
- C. Operating Systems
- D. Programming Languages
- E. Miscellaneous
- F. Games
- G. Business and Finance
- H. Communications
- I. Graphics
- J. IBM Personal Computers
- K. Computers and Society
- L. General Operations
- M. Data Base Management
- N. Simulation
- O. General
- P. Education
- Q. Spreadsheets
- R. Hardware



1-L, 2-G, 3-H, 4-M, 5-P, 6-A, 7-F, 8-I, 9-N, 10-Q, 11-B, 12-E, 13-J, 14-O, 15-R, 16-C, 17-D, 18-K

99⁴⁴/₁₀₀%

IBM Compatible



TAVA PC

- 2-360K Disk Drives with room for internal hard disk.
- 2 Serial Ports/1 Parallel Port
- 256K Internal RAM
- 5 IBM Compatible Expansion Slots



INCLUDES:

MS-DOS 2.11 operating system and your choice of IBM compatible monochrome or color graphics card.

\$1895⁰⁰

Computers

SANYO:	
MBC-550	\$799
MBC-555	999
SANYO OWNERS: Call for details on our double sided disk drive upgrade.	
EAGLE:	
Spirit 2	\$1984
256K, SuperCalc, MS-DOS 2.0	
PC Plus	CALL
1600 Series	CALL
COLUMBIA:	
All Models	CALL
TAVA:	
All Models	CALL
TOSHIBA:	
T-100	CALL
ALTOS/TELEVIDEO:	
All Models	CALL

Monitors

TAXAN:	
HiRes Green	\$ 97
HiRes Amber	107
RGB 210	299
RGB III	399
RGB 420 (IBM)	425
TTL/Green (IBM)	145
TTL/Amber (IBM)	150

Printers

OKIDATA:	
ML 82A	\$299
ML 92	419
ML 93	625
ML 84	760
2350/2410	CALL
STAR MICRONICS:	
Gemini 10X	\$269
Gemini 15X	369
Delta 10	399
Delta 15	529
Radix 10	649
Radix 15	749
TOSHIBA:	
1350/1351	\$1295
1340	777
SILVER REED:	
EXP 400	\$299
EXP 500	399
EXP 550	499
EXP 770	875
NEC:	
3510	CALL
3550	CALL
2010	CALL
2050	CALL

Modems

HAYES:	
1200	\$469
1200B	449
300	205

IBM Accessories

- Call for details:
- AST RESEARCH
 - HERCULES
 - QUADRAM
 - STB

Miscellaneous

KOALA PADS:	
Commodore 64	\$56
Apple	73
IBM	89
CABLES:	
IBM Parallel	\$22
Standard Parallel	25
DISKETTES:	
3M SS/DD/5 1/4	\$21
3M DS/DD/5 1/4	28
BASF SS/DD/5 1/4	19
BASF DS/DD/5 1/4	26
INNOVATIVE CONCEPTS:	
Flitp N File 50	\$19

To Order

- **Pricing Policy:** Advertised prices reflect cash discount. Certified check or money order please. Company or personal checks allow two weeks for check to clear. Prices subject to change without notice.
- **COD Orders:** We will accept COD orders for up to \$500. COD orders please add 2% to advertised prices.
- **Credit Card Orders:** We accept VISA MasterCard. Credit card orders please add 3% to advertised prices.
- **Sales Tax:** Ohio residents add 5 1/2% state sales tax.
- **Purchase Orders:** We will accept PO's from major Universities and Fortune 1000 companies. Terms-net 30 days.
- **Shipping & Handling:** Please add 2% to total of all orders for shipping & handling. (\$2.50 minimum)



USE YOUR CREDIT CARD!
TOLL-FREE ORDER LINE:
800/321-7492
 IN OHIO CALL 216/746-0820

LOGIC Unlimited

1323 Florencedale Avenue Youngstown, Ohio 44505 Technical Assistance/Order Status 216/746-0820

CIRCLE 130 ON READER SERVICE CARD

This is THE PASCAL COMPILER You've Been Hearing About

"It's almost certainly better
than IBM's Pascal for the PC...
Recommended."

Jerry Pournelle
Byte, May 1984

\$49.95

"If you don't have CP/M [for
your Apple], Turbo Pascal is
reason enough to buy it."

Cary Hara
Softalk Apple, May 1984

VERSION 2.0

"If you have the slightest interest in Pascal... buy it."
Bruce Webster, Softalk IBM, March, 1984

And Now It's Even Better Than You've Heard!

- Windowing (IBM PC, XT, jr. or true compatibles)
- Color, Sound and Graphics Support (IBM PC, XT, jr. or true compatibles)
- Optional 8087 Support (available at an additional charge)
- Automatic Overlays
- A Full-Screen Editor that's even better than ever
- Full Heap Management—via dispose procedure
- Full Support of Operating System Facilities
- No license fees. You can sell the programs you write with Turbo Pascal without extra cost.

Yes. We still include Microcalc... the sample spreadsheet written with Turbo Pascal. You can study the source code to learn how a spreadsheet is written... it's right on the disk.* And, if you're running Turbo Pascal with the 8087 option, you'll never have seen a spreadsheet calculate this fast before!

*Except Commodore 64 CP/M.

Order Your Copy of TURBO PASCAL® VERSION 2.0 Today

For VISA and MasterCard orders call toll free:
In California:

1-800-227-2400 x968
1-800-772-2666 x968

(lines open 24 hrs, 7 days a week)

Dealer & Distributor Inquiries Welcome 408-438-8400

Choose One (please add \$5.00 for shipping and handling for U.S. orders. Shipped UPS)

- _____ Turbo Pascal 2.0 \$49.95 + \$5.00
- _____ Turbo Pascal with 8087 support \$89.95 + \$5.00
- _____ Update (1.0 to 2.0) Must be accompanied by the original master \$29.95 + \$5.00
- _____ Update (1.0 to 8087) Must be accompanied by the original master \$69.95 + \$5.00

Check _____ Money Order _____
VISA _____ MasterCard _____
Card #: _____
Exp. date: _____

BORLAND
INTERNATIONAL

Borland International
4113 Scotts Valley Drive
Scotts Valley, California 95066
TELEX 172373

My system is: 8 bit _____ 16 bit _____
Operating System: CP/M 80 _____
CP/M 86 _____ MS DOS _____ PC DOS _____

Computer: _____
Disk Format: _____
Please be sure model number & format are correct.

Name: _____
Address: _____
City/State/Zip: _____
Telephone: _____

California residents add 6% sales tax. Outside U.S.A. add \$15.00 (if outside of U.S.A. payment must be by bank draft payable in the U.S. and in U.S. dollars.) Sorry, no C.O.D. or Purchase Orders

PCs Get Asyst with Number Crunching

BY CRAIG STARK

NEW YORK—Most brainy PCs lead lives of quiet desperation, fettered to word processing and spreadsheet programs whose mathematical demands are hardly enough to keep an artificial intelligence alive. And while their PCs' 8087 arithmetic coprocessor sockets lie fallow, most scientists and engineers hold to the traditional belief that only minicomputers can meet their needs for serious mathematics and graphics.

Asyst, a new program from Macmillan Software Co., promises to change this limited way of thinking and to stimulate the silicon in the most underachieving

PC or XT. With its three modules designed specifically to use the 8087 coprocessor and PC-DOS, Asyst represents a totally integrated approach to the problems of scientific and engineering data acquisition, analysis, and display.

Asyst provides user-selectable interfaces for widely used data acquisition boards (such as Data Translation, Keithley, and Tecmar), and for standard output devices (HP plotters, dot matrix printers, and color graphics terminals). It also incorporates an easily learned programming language that allows a user to tailor the pro-

gram's very powerful built-in mathematical and display capabilities to his specific application, even to the point of assigning complete plotting and/or analyzing routines to a single function key.

Unlike many software programs, Asyst can utilize the full 640K memory potential of the PC. It permits up to 16 dimensions and up to 64K per array, and it includes a flexible array editor. The program provides all standard statistical and arithmetic operations and functions, and, using the 80-bit precision of the 8087, can handle single- or double-precision real, integer, or complex numbers. (Most mainframe calculations are restricted to 64-bit precision.)

Fast Fourier transformations and inverses, differentiation and integration, and data smoothing and filtering are among the data-manipulation functions provided by Asyst. It

can also do matrix multiplication and evaluation, as well as root extraction of polynomials. Autoplotting with linear or polar coordinates and multiple user-defined windows are also provided.

Asyst is scheduled for release in September; its documentation will include extensive tutorial material. The aggregate cost of all three modules will be approximately \$1,700. PC requirements include the 8087 coprocessor, a minimum of 320K RAM, one disk drive, and a graphics board. Applications requiring an external data source will additionally require a suitable analog/digital board. The program may be put onto a hard disk, but one floppy disk is required during boot-up.

For more information on Asyst, contact Macmillan Software Co., 866 Third Ave., New York, NY 10022, (212) 702-3428. ■

Lights, Camera, Enter! Hollywood Goes PC

BY HARVEY BERGER

LOS ANGELES—The business of show business has finally come of age. For the first time, members of the Hollywood film and television community recently came together to scout many of the exciting new computer products available to help write and produce films and television programs. The American Film Institute held a small, 1-day seminar. Mirros For Movies, and Live Time Productions put on the first 2-day Micro Show at the Los Angeles Convention Center.

The big attraction was show-business software, virtually all of it designed around the IBM PC and MS-DOS-compatible systems.

Welcome Developments

A welcome development is dedicated production management software. Budget preparation, script breakdown, scheduling and production logistics, and production accounting have advanced beyond the do-it-

yourself programming necessary with off-the-shelf spreadsheet and database programs. The vertical-market, dedicated packages come in all shapes and sizes, from \$500 for a simple budgeting program like *Associate Producer* (from Comprehensive Video Supply of Northvale, New Jersey), to \$27,000 for *FilmTrac* (from Constant-C Productions of Santa Monica, California).

The leading ones, however, seem to be those sporting the major industry clients. *Data Mogul*, from Quantum Films of Los Angeles, offers a combat-tested production budgeting and script breakdown program for a PC with 128K. Clients include MGM/UA and the Brillstein Company (producers of *Buffalo Bill* for NBC).

DotZero, also of Los Angeles, has budgeting and production scheduling software for the PC, but its other related programs run only on the Apple II. Clients include Columbia Pictures and The Ladd Company.

FilmTrac is a budget and scheduling program complete

with a dedicated PC-XT. Just reaching the market now, the system has been used extensively by 20th Century Fox, first on a minicomputer, and for several months on the IBM XT as well.

Still in beta testing is *P.M.*, from Screenplay Systems in Burbank, a budgeting program designed by a working production manager and requiring only floppies. Others, like *FMS* from Heritage Systems of Cupertino, California, offer script breakdown, stripboard scheduling, budgeting, and accounting, but require hard disk systems.

Technical Carrots

Although the concentration at the shows was on applications, there were some technical carrots, as well. CompuPrompt, of Los Angeles, exhibited a color computerized system for on-camera electronic talent prompting.

But for *Star Wars* fans, nothing could hold a laser sword to Lucasfilm's Editdroid by Convergence of Irvine, California. This \$87,000 computer video-editing system uses videodiscs for maximum speed and a touch pad and trackball for fast, fingertip control. ■

New Newsletters

NEW YORK—There are two new newsletters of possible interest to PC users:

"VDT News: The VDT Health and Safety Report" will cover "all sides of the VDT debate," including the impacts of VDT use on operators, said editor Mark Pinsky.

The bimonthly is available for \$18 annually for individuals, \$35 for businesses from: P.O. Box 1799, Grand Central Station, New York, NY 10163.

For IBM and compatible users, there's a monthly report, "PC Accounting Trends," which covers audit, write-up and accounting practices. A subscription is \$59 per year from P.O. Box 435, 1850 Union St., No. 4, San Francisco, CA 94123. ■

SEEQUA SHOWS YOU HOW TO GET AN IBM PC FOR JUST \$1995.

BUY A CHAMELEON BY SEEQUA.



The Chameleon by Seequa does everything an IBM PC does. For about \$2000 less than an IBM.

The Chameleon lets you run popular IBM software like Lotus® 1-2-3™ and dBase II.® It has a full 83 key keyboard just like an IBM. A disk drive like the IBM. And a bright 80 x 25 character screen just like an IBM.

But it's not just the Chameleon's similarities to the IBM that should interest you. Its advantages should, too. The Chameleon also has

an 8 bit micro-processor that lets you run any of the thousands of CP/M-80® programs available. It comes complete with two of the best programs around, Perfect Writer™ and Perfect Calc.™ It's portable. And you can plug it in and start computing the moment you unwrap it.

So if you've been interested in an IBM personal computer, now you know where you can get one for \$1995. Wherever they sell Chameleons.

The Chameleon by



SEEQUA
COMPUTER
CORPORATION

8305 Telegraph Road
Odenton, MD 21113

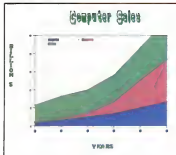
Chameleon shown with optional second disk drive.

To learn more about Seequa or for the location of the Seequa dealer nearest you, call (800) 638-6066 or (301) 672-3600.

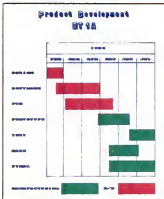
IBM is a registered trademark of International Business Machines Corporation.

WHEN SPREADSHEETS DON'T GIVE YOU THE PICTURE...

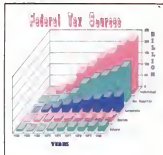
LINE CHARTS STATISTICS



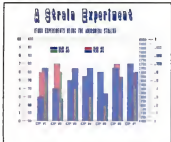
GANTT CHARTS PROJECT SCHEDULING



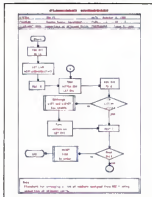
3-DIMENSIONAL BAR CHARTS



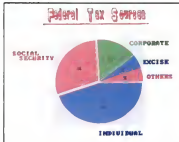
MULTI-SCALE BAR CHARTS NEGATIVE BAR CHARTS



FLOW CHARTS ORGANIZATION CHARTS



PIE CHARTS



THE FIRST COMPLETE GRAPHICS PROGRAM DESIGNED FOR EVERY BUSINESS USE ON IBM-PC's*

ENERGRAPHICS™

Dynamic and so easy-to-use, **ENERGRAPHICS** is already helping business managers at 40 Fortune 500 companies. **ENERGRAPHICS** is used in Finance, Marketing, Sales, Advertising, Research and Data Processing. Both VisiCalc® and Lotus 123™ spreadsheet files interface with **ENERGRAPHICS**. For the first time business executives can plan, project, present, analyze and report with the best looking professional graphics available on the IBM-PC and compatibles.

VisiCalc is a registered trademark of VisiCorp.
Lotus 123 is a trademark of Lotus Development Corp.

Call 800-325-0174
(except in Missouri)
for our detailed

ENERGRAPHICS brochure

ENERTRONICS

Enertronics Research, Inc.
150 N. Meramec • Suite 207 • St. Louis, MO 63105 • (314) 725-5566

CIRCLE 134 ON READER SERVICE CARD

PRODUCT REVIEW

VideoShow Brightens Slide Shows, But Pales For Future Creativity

BY TOM CHRISTOPHER

PictureIt

General Parametrics
1505 Solano Ave.
Berkeley, CA 94797
(415) 524-3950

List Price: \$595

Requires: 128K RAM, two disk drives.

VideoShow

General Parametrics
List Price: \$3,295 (with one disk drive and 256K RAM)

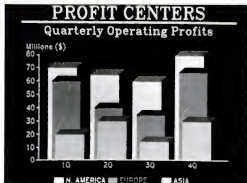
Business presentation graphics—or super graphics or whatever you want to call it—is becoming an important market, and General Parametrics, a new company in Berkeley, California, is tuning in.

The PC compatible VideoShow has a single disk drive, contains 256K RAM, and can be configured to any RGB monitor, TV set, or video projector and can even be videotaped with a voice-over. Its software is called *PictureIt*, which also runs on MS-DOS systems with 128K RAM. A phenomenal range of 1,000 colors allows very subtle effects in blending and combining tones.

The resolution is turbocharged with a technique called MacroVision that replaces pixels and pixel triads with variable groups of dots. This process involves hardware and software that can individually address each dot to turn it on and off at

be chosen by the user from a range of fonts stored in removable cartridges.

This laser printer can be used with a variety of office equipment. To create links between PCs and its LP4120, Ricoh collaborated with Computer Visions, a consulting firm in Oakland, New Jersey. James Hare of Computer Visions says that the software makes the laser printer work fairly well with



ten different levels of intensity. Until now pixel intensity level has always been your choice—as long as you chose on or off.

General Parametrics has redefined the number of dots in a pixel and packs in as many as ten RGB elements, depending upon the color and the screen area to be covered. This is the first time this has been accomplished on a micro. The results are crisp and colorful.

Remote Control

The unit weighs 16 pounds and comes with a nifty handheld remote control device so, the-

oretically, you can glide back in your Barcelona lounge, sip iced tea, and create instant business presentation graphics. Not a bad idea. There's a large market for a system like this for both in-house presentations to employees, board meetings, and sales conferences, as well as outside presentations to clients.

The benefits of a self-contained system such as this include the price (under \$4,000), quality control and security. Specialty houses can charge up to \$100 a slide and add extra variables to material that is often sensitive or timely. VideoShow lets you create your presentation in your own "bug"-free, lead-coated room, handoff the system to your wrist, and take the back alleys to your meeting.

The only serious drawback to the concept of VideoShow is that it doesn't allow for much input creativity. You can't draw or create anything new.

Limited Formats

Here is where VideoShow lets down. There are only 25 different slide formats. The typography and color choices are nice and they can be overlaid and mixed to some extent. But unless there are a lot of optional software packages with many more designs and layouts updated on a frequent basis, this format will quickly become stagnant.

VideoShow, for all of its baby pixels and 1,000 colors and remote control, is too rigid in its design options. The company has promised additional presentation options, but for now there is not enough creative input. ■

Laser Printer Puts PCs on Its Beam

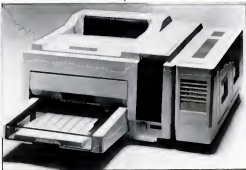
WEST CALDWELL, N.J.—A new 112-pound, tabletop laser printer, the Ricoh LP4120, can print the text output of a PC at a rate of 12 pages per minute. The laser printer generates four different 128-character fonts; two fonts are built into the printer's controller, but the other two can

most programs, but the company has developed drivers lined up for specific programs such as *1-2-3*, *dBASE II*, and *WordStar*.

With the current Ricoh LP Controller 120, the laser printer can only produce character output. Ricoh plans to offer another controller that can handle bit-mapped graphics.

For PC users, the company also makes a line of three daisy wheel printers, each with both serial and parallel interfaces. They are the 20 character-per-second (cps) Model RP2200Q (\$800), the 40 cps model RP1500Q (\$1,500), and the 50 cps RP1600Q (\$1,900). These letter quality printers are designed for relatively quiet (50 decibel) operation.

The price of the Ricoh LP4120 laser printer is approximately \$14,000. For more information, contact Ricoh Corporation, 5 Dedrick Place, West Caldwell, NJ 07006, (201) 882-2000. ■



KNOWLEDGE SYSTEMS INC.

Information Processing Components, Selected for Performance and Value.

FREE SHIPPING — NO EXTRA CHARGE FOR MASTER CARD AND VISA
PREPAID PRICES INCLUDE SHIPPING AND INSURANCE, UPS Ground Continental USA only.

MONITORS

Amdek	
300A	143
300C	133
310A	175
Dynax	
12" Green	127
12" Amber	138
Taxan	
RGB III	446
RGB 420	534
PGS	
PGS HX12	473
MAX 12	196
SR 12	Call
USI	
Pi 2 12" Green	125
Pi 3 12" Amber	142
Sanyo	
BT12 HiRes	195
NEC	
JB 1201	162
JB 1205A	172
JC 1410	817

MODEMS

Hayes	
300	207
1200	493
1200B	432
Micromodem IIe W/T	242
US Robotics	
Password	307
Autodial 212A	460
Novation	
Access 1,2,3	454
Apple Cat II	277
Prometheus Products	
Promodem 1200	365
Options Processor	78
Memory \$30 per 16K up to 64K	78
Alphanumeric Display	78
Procom Software-Apple, IBM	78
Rixon	
PC212A	415
P212A	415

IBM ACCESSORIES

Asst Research	
6-Pack	225
Combo Plus	225
Mega Plus	225
64 K Ram Set	55
Plantronics	
Color Plus	375
Hercules Computer	
Hercules Graphics Card	350
Amdek	
MAI	477
Koala Graphic Tablet	Call
Everex	
Dual Display	Call
Number 9	
Number 9 1448X1448	Call

PRINTERS

C. Itoh	
Prowriter 8510P	120 cps 340
Prowriter 8510SP	180 cps 477
Prowriter 1550P	180 cps color 552
Prowriter 1550SP	180 cps 685
Prowriter 1550SPC	180 cps color 777
New CX4800 plotter	518
New A10 18 cps Daisy Wheel	510
Starwriter F10 40 cps Daisy Wheel	915
Printmaster F10 55 cps Daisy Wheel	1285
We Know How to Make Your Prowriter IBM Compatible	
Okidata	
92p	160 cps 427
93p	90 cps 705
IBM Printer Rom	45
2350	350 cps 2000
2410	350 cps 2380
Star Micronics	
Gemini 10X	120 cps 285
Gemini 15X	120 cps 423
Delta 10	160 cps 448
Delta 15	160 cps 633
NEC	
3550	40 cps 1698
7710	55 cps 1899
Brother	
16 cps	569
23 cps	765
34 cps	935
Dynax	
DX15	14 cps 477
Keyboard	149
IDS	
Prism 132 color	1535
Prism 80 color	1419
Transtar	
315 color	450
Silver Reed	
550	595
500	431
Juki	
18 cps	450
Teletex	
12 cps	455
Mansman Tally	
80 cps	315
160 cps	641
DISK DRIVES	
For IBM	
Tandon TM100-2	180
Teac 55B 1/2 Height	175
Pan/Shug 1/2 Height	165
CDC	220
For Apple	
Super 5 1/2 Height	203
Quantum Ap 100-Y	242
Quantum Ap 105-Y 1/2 Height	213
Quantum Controller	48
Rana 1	255
Rana 1 with Controller	325
Hard Disks	
Call	Call

HAVE IT YOUR WAY

18 Slot Chassis
125 Watt Power
and
IBM Compatible CPU



IMP SYSTEM — \$1,300

The S-100 Concept for IBM Compatible Systems

You want a computer. You like the flexibility and options of the IBM PC. EXCEPT there are some things that you want your way. YOU:

- Don't like the funny keyboard.
- Want 1/2 height drives so you can add a hard disk later.
- Want a powerful supply that is adequate for disk expansion.
- Want more than three additional slots.
- Want a faster or different CPU.
- Want higher resolution graphics.
- Want Dvorak or other keyboard layout.

TIME SPECTRUM	List	Our
APSTK	395	Call
CRAMBO	369	Call
BIG BLUE	359	Call
EASIBOARD + 15 functions	600	Call
Maynard Randstar	350	Call
PC GT 80186 8MHz	230	Call
Scion	1195	Call
Halco-Instant High Res Graphics	1595	Call
PROTIUM	150	Call
Keytronics Keyboard QWERTY	169	Call
Keytronics Keyboard DVORAK	169	Call
Keytronics Keyboard 5151	255	Call
Lotus 1-2-3 users, you need this keyboard	255	Call

SOFTWARE

Ashton Tate	
dBase II	389
Friday	184
Software Arts	
TK Solver	215
Solver Pac	88
Seasoned Systems	
Sure Stroke Dvorak Tutor	48
Sorcim	
Super Calc III	189
Micro Pro	
Wordstar	258
Mail Merge	131
Spellstar	131
Pro Pack	475
MBSI	
Realworld GI	533
Realworld AR	533
ATI	
For Most Software Programs	69
Hayes	
Smart Com	72
Micro Stuff	
Crosstalk	134
Micro Rim	
RBase	344

COMPUTERS

Franklin QMS 1200	1709
Columbia 1600-1	2600
TAVA PC	1900
Eagle I	1650
Eagle II	2050
Eagle III	2270
Eagle IV	1500
Eagle PC-2	2730
Eagle 1620	3400
Eagle 1630	5270
Eagle 1640	6400

TERMINALS

Televideo	
563	563
717	717
914	914
Wyse	
569	569
Teletex	
460	460

UNIX

QNX System 5	Call
"C"	Call

California Residents add 6.5% State Sales Tax

Shipping extra for outside USA. FPO and APO

Please include an address reachable by UPS, no P.O. boxes, and your phone number where we can be reached during the day.

(213) 344-4455

Knowledge Systems Inc.

19707 Ventura Blvd.

Woodland Hills, CA 91364

ORDERING TERMS

Prepaid: Money Orders, Cashier's Checks, Certified Checks, Bank Wire Transfers, Master Card, Visa, AMEX (add .3% for AMEX) and Personal Checks (allow 15 banking days for all personal checks). Please include Valid Driver's License # and Major Credit Card for Identification.

OLYMPIC SPECIALS

<p>PROMETHEUS Promodem 1200 \$365</p> <p>Options Processor \$78</p> <p>Memory \$30 per 16k up to 64k</p> <p>Alpha Numeric Display \$78</p> <p>Procom Software-Apple or IBM \$99</p>	<p>Megabyte Floppy TEAC 55F \$195</p> <p>For those who need more drive space & have less than infinite resources. These drives will run off your already existing controller, up to four drives. Use J Format so you can read standard density diskettes and use to back up your small hard disk.</p> <p>J Format \$60</p>	<p>384 K IMP SYSTEMS Configured 18 Slot 125 Watt Supply</p> <p>Parallel serial clock game port, Hercules graphics card, 2 ea. 1/2 high drives, Maynard sand star controller, Keytronic 5151 keyboard, Amdek monitor, amber</p> <p>\$2995</p> <p>Installed 10 MB Hard disk \$1100</p>	<p>KEYTRONICS 5151 \$199</p> <p>Spread Sheet, Data Base, Touch Typists and Star Ship operators, you need this keyboard to avoid the deadly Terminal Numlock syndrome.</p> <p>New Dvorak 5151 \$199</p> <p>Sure Stroke, Dvorak tutor \$48</p> <p>Apple disk and keyboard KB200 \$240</p>			
<p>TSENG LABS 132 X 44 VIDEO</p> <p>ULTRAPAK \$585</p> <p>ULTRAPAK RAM 64K \$200</p> <p>ULTRAPAKDisk Controller \$187</p> <p>Combines the features of a multi-function card with that of a super spread sheet video card 132 X 44, with serial parallel ports & clock, either RAM module or floppy controller.</p>	<p>DATASHIELD UPS UNINTERRUPTABLE POWER SUPPLY</p> <p>Some know that it takes much less than a nuclear bomb to run your whole day. Blackouts, brownouts, surges, spikes and line noise name a few.</p> <p>200 Watt for 5 minutes, 10% Load for 20 minutes</p> <p>\$310</p> <p>300 Watt for 5 minutes, 10% Load for 20 minutes</p> <p>\$420</p>	<p>dimension™</p> <p>68000</p> <p>AUTHORIZED DEALER</p> <p>YES! We have them in stock</p> <p>Local Sales</p> <p>Runs almost anything now and will run 68000, CPM 68K, UNIX and "C" in the future.</p>	<p>SPACE TABLETS and ADVANCED SPACE GRAPHICS SYSTEMS</p> <p>Interactive 3-D Graphic design for micros. Plugs into your game port to give the most productive design. An aid for architects, designers, inventors, space habitat engineers, and other leading edge technologists.</p>			
<p>APSTEK MULTI FUNCTION CARD</p> <p>• Parallel Port • Serial Port • Clock • Calendar • Game Port • Print Spooler & Diagnostics • Up to 38k</p> <p>64K \$275</p>	<p>ALLOY TAPE BACK-UP 17 MEGABYTES</p> <p>Using a 3M data cassette. File oriented back up system allows infinite back up for any sized drive.</p> <p>\$1680</p> <p>External drive and controller.</p>	<p>SURGE FREE</p> <p>Surge protectors with noise suppression</p> <p>SF 600 M \$26</p> <p>6 outlets direct plug into wall socket</p> <p>SF 1000 \$60</p> <p>10 outlets switched with circuit breaker and 6 foot cord</p>	<p>HARD DISKS</p> <p>33 Megabytes formatted \$2280</p> <p>External drive with controller & cable</p> <p>15 Megabytes formatted \$1440</p> <p>External drive with controller & cable</p>			
<p>STARWRITER C ITOH F 10-40 \$915</p>	<p>QNX</p> <p>NEW: Multi-user systems for IBM PC. Up to 16 users per system</p> <p>\$580</p>	<p>VERBATIM DATALIFE</p> <p>Single Side, Double Density</p> <p>100 \$225</p>	<p>8 Serial Ports on a Single Card. Control Systems 8 Port IO \$690</p> <p>Take 1 IBM PC add 1 QNX operating system 1-2 of these cards and star for a multi-user system of up to 16 users.</p>			
<table> <tr> <td> <p>STANDARD SYSTEMS</p> <p>256K RAM, 2 each 320K Drives and Controller, Hi-Res Monitor & Video Card, 2 Serial and 1 Parallel ports. COLOR: add \$100.</p> <p>\$2001</p> </td><td> <p>TAVA NUDE 256K CPU \$1175</p> </td><td> <p>I WISH</p> <p>Same as the Standard. PLUS 10 MB Hard Disk and 10 MB Tape back-up. COLOR: add \$100.</p> <p>\$4001</p> </td></tr> </table>				<p>STANDARD SYSTEMS</p> <p>256K RAM, 2 each 320K Drives and Controller, Hi-Res Monitor & Video Card, 2 Serial and 1 Parallel ports. COLOR: add \$100.</p> <p>\$2001</p>	<p>TAVA NUDE 256K CPU \$1175</p>	<p>I WISH</p> <p>Same as the Standard. PLUS 10 MB Hard Disk and 10 MB Tape back-up. COLOR: add \$100.</p> <p>\$4001</p>
<p>STANDARD SYSTEMS</p> <p>256K RAM, 2 each 320K Drives and Controller, Hi-Res Monitor & Video Card, 2 Serial and 1 Parallel ports. COLOR: add \$100.</p> <p>\$2001</p>	<p>TAVA NUDE 256K CPU \$1175</p>	<p>I WISH</p> <p>Same as the Standard. PLUS 10 MB Hard Disk and 10 MB Tape back-up. COLOR: add \$100.</p> <p>\$4001</p>				

California Residents add 6.5% States Sales Tax
Shipping extra for outside USA. FPO and APO
Please include an address reachable by UPS, no P.O. boxes, and your phone number where you can be reached during the day.

(213) 344-4455
Knowledge Systems Inc.
19707 Ventura Blvd.
Woodland Hills
CA 91364

ORDERING TERMS
Prepaid. Money Orders, Cashier's Checks, Certified Checks, Bank Wire Transfers, Master Card, Visa, AMEX (add 3% for AMEX) and Personal Checks (allow 15 banking days for all personal checks). Please include Valid Driver's License # and Major Credit Card for Identification.

PRODUCT REVIEW

Microsoft's Word 1.1 Cuts the Perspiration

BY ALAN HOENIG

Word, Version 1.1
Microsoft Corporation
Box 97200
Bellevue, WA 98009
(800) 426-9400
(206) 828-8088
List Price: \$375

Requires: IBM PC, XT, or PCjr, one double-sided disk drive, 128K RAM. (Note: To see character attributes such as italic, superscript, etc., displayed on screen, a graphics card is required. In addition, not all printers support all the attributes and different printers support different type fonts.)

Writing, to paraphrase Thomas Edison, is one percent inspiration and 99 percent perspiration. The first version of Microsoft's *Word* word processing program was a notable effort to improve that equation especially in rewriting and re-writing. *Word* was at once extraordinary and idiosyncratic; extraordinary in the efficiency with which you could use it to pound a document into submission, but idiosyncratic in that many mundane but vital chores were far more difficult to perform than necessary ("The Unfinished *Word*," PC, Volume 3 Number 3). Now, Microsoft's release of Version 1.1 of *Word* removes most of these problems while retaining the strengths of the original.

The original's strengths include super formatting, instant on-screen reformatting, on-screen display of print characteristics (double underlining, small caps, and italic, for example), an undo command, graceful and easy footnoting, and its special rubbery cursor. But those features are just the tip of the iceberg.

One of the original *Word*'s best features is its pioneering use of windows. *Word* uses a nonoverlapping window tiling

system. Up to eight files each have a separate window, or several windows can be applied to different parts of a single file.

Comfortable Mouse

The original *Word* also has extensive mouse support, and I have found the system's mouse so natural to use that it has become indispensable to me. Unusual power also resides in

Not Perfect

But the original *Word* wasn't perfect. Some tasks gave it fits. File save operations were incredibly lengthy. Saving a 3,000-word file required about 40 seconds. There was no on-screen indication of where in your document file you were. Some critics felt that the monitor area allocated to text was too small, severely limiting the amount of text visible at any one time.

The program came on two copy-protected disks, so startup involved a clumsy disk-swapping process. There was no print merge or spelling check facility. (*Word*'s document files are created differently than those of any other word pro-

cessor and are unreadable to standard spelling checkers.) Finally, the original version of *Word* supported only a few printers.

The new enhancements contained in Version 1.1 address these criticisms and acceptably speed up file save. The same 3,000-word file can now be saved in 20 seconds. *Word* now tells you what page in your document you are on, provided you have invoked the PRINT REPAGINATE command (which has also been substantially speeded up) or printed the document. On the fly, *Word* still can't give any information on line number or character position, but probably no program complex enough to accommodate documents with running heads, different size type fonts, and multicolumn printing could do any better.

Hard Disks

The *Word* program disk is still copy protected, but it's now a single disk, making program startup much smoother. Microsoft distributes a second disk for backup and stands ready to replace defective disks for any registered user—a relatively reasonable way to handle the copy protection dilemma. Version 1.1 also has a batch file that lets *Word* be copied to a hard disk, thereby eliminating the need to boot from a floppy. Using DOS commands, *Word* 1.1 can also be copied into a RAMdisk.

A merge facility is standard in Version 1.1, and the program now works directly with the output of *dBASE II* and other programs. Several spelling checkers from independent vendors, including my favorite, *The Word Plus* by Oasis Systems, have been specifically tailored to work with *Word*.

Finally, *Word* now supports over 20 different printers, including three generic teletype-like printers, and Microsoft includes (cryptic) instructions for printing on just about any printer. As soon as the hardware becomes available, *Word* Version 1.1 will be able to drive laser printers, automatic typesetting machines, and just about anything else. At that time, *Word* should be able to deliver camera-ready, professional copy.

I have extensive experience working with both *Microsoft Word* and *Wordstar*. Ease of text entry is about the same for both processors, but *Word* pulls far ahead in editing. When it's time to rewrite and re-rewrite, *Word* is about twice as productive. With the update to Version 1.1, *Microsoft Word* has become my word processor of choice. ■



Microsoft *Word* 1.1 displays condensed monochrome text with a Hercules board

Word's cursor. Normally a highlighted rectangle the size of a single character, it can be stretched and pulled like a piece of Silly Putty to cover any portion of your text. *Word* commands apply to the entire region thus selected. Block moves, in particular, are quick and easy.

The original *Word* also supports an on-line, context-sensitive help feature, glossary buffers so you can add boilerplate paragraphs instantly, and style sheets—collections of special format descriptions. Such style sheets, which seem to be an emerging trend among 16-bit word processors, allow you to apply complex and personalized formats to your documents with a few quick keystrokes. They are handy for consistently achieving the same look among different chapters of a book, among other uses.

When Lotus wanted better graphics for 1-2-3, they chose a better graphics card—HERCULES.



And then we became a standard.

When the IBM® PC was introduced over 2 years ago, the talented people at Lotus realized that it was limited by a lack of high resolution graphics. They knew that this was going to have an adverse effect on 1-2-3's graphics. And Lotus didn't want anything to hold back their revolutionary software.

So they turned to Hercules.

Lotus recognized that the Hercules Graphics Card delivered the performance they wanted. It offered high quality text and high resolution graphics on IBM's monochrome display. It completely replaced the IBM monochrome card. And it didn't cost an arm and a leg.

Since then, Hercules has sold a lot of Graphics Cards. So many that the Hercules Graphics Card has become the high resolution standard for the IBM PC. And this means that there is more high resolution graphics software available for Hercules than for any other graphics card you can buy.

Software like Microsoft® Word. Our high resolution makes Word's text much sharper and easier on your eyes. And there are other programs for business graphics, computer aided design, terminal emulation and programming.

Call for our free information kit. See why the company that made the first graphics card for the IBM PC still makes the best.



**Hercules. We're
strong on graphics.
800 255 5550 Ext. 400**

Address: Hercules, 2550 Ninth St., Berkeley, CA 94710 Ph: 415 540-6060 Telex: 754963 Features: IBM monochrome display graphics resolution of 720x348; parallel printer port; text mode software compatibility; free software for programming; 2 year warranty. Foreign distributors: Compuserve/Canada; Reflex/U.K.; Computer 2000/W. Germany; Edisoft/France; SourceWare/Australia. Trademarks/Owners: Hercules/Hercules Computer Technology; Microsoft/Microsoft Corp; IBM/International Business Machines; Lotus & 1-2-3/Lotus Development.

No PC Shopping Sprees for Fortune 500

NEW YORK—Most U.S. corporations don't like to go shopping, especially for personal computers. This was only one of the facts uncovered by The Omni Group, Ltd., in its recent survey: "The Office Automation Challenge: American Business Responds." The Omni Group,

an office systems consulting and research firm, interviewed over 800 executives from companies of varying sizes to determine office automation purchasing strategies and objectives. The survey was underwritten by 12 information technology and service companies, including AT&T Information Systems and Hewlett-Packard Co.

U.S. corporations dislike going to retail stores for their personal computers and word processing equipment; they

would rather deal directly with the manufacturer. Incidentally, purchasing office equipment from an IBM Product Center is considered the same as purchasing straight from the manufacturer. Warren Walbrand, director of research at The Omni Group, found that companies want to purchase equipment from manufacturers that seem stable and economically viable.

Another finding, which will surely disappoint personal computer manufacturers, is that sec-

retaries in most Fortune 500 companies will continue to use dedicated word processors as opposed to personal computers for at least the next 2 years. The margin will be a little narrower for small and medium-sized companies.

The office automation survey also revealed that the use of local area networks to connect word processors, personal computers, printers, and even mainframes, will proliferate over the next 2 years. —*Jane Mintzer*

Calendar of Events

DATE	EVENT	COMMENT	LOCATION	CONTACT
August 2-4	Great Southern Computer Show	Hardware, software, accessories targeted towards business end-users.	Civic Center Charlotte, NC	Great Southern Computer Shows P.O. Box 655 Jacksonville, FL 32201 (904) 356-1044
August 12-15	1984 ASME International Computers in Engineering Conference and Exhibit	Panel discussions, paper presentations, product exhibits.	Hilton Hotel Las Vegas, NV	American Society of Mechanical Engineers 345 E. 47 St. New York, NY 10017 (212) 705-7795
August 12-17	The Radcliffe Computer Publishing Course	Course on how computers are changing publishing industry.	Radcliffe College Cambridge, MA	Radcliffe Publishing Procedures Course 6 Ash St. Cambridge, MA 02138 (617) 495-8678
August 16-17	Local Area Networks	In-depth look at local area networks.	Ramada Inn-Old Town Washington, DC	Institute for Advanced Technology Control Data Corp. 6003 Executive Blvd. Rockville, MD 20852 (800) 638-6590 (301) 468-8576
September 5-7	National Software Show	Microsoft software specific trade show.	Anaheim Convention Center Anaheim, CA	Raging Bear Productions 21 Tamal Vista, #175 Corrie Madera, CA 94925 (800) 732-2300 (415) 924-1194
September 11-14	UNIX Systems Expo/84	Conference and exhibition for users and resellers.	Los Angeles Convention Center Los Angeles, CA	Computer Faire, Inc. 181 Wells Ave. Newton, MA 02159 (617) 965-8350
September 20-23	Userfest/New York	Hardware, software, accessories.	Madison Square Garden New York, NY	Northeast Expositions 822 Boylston St. Chestnut Hill, MA 02167 (617) 739-2000
September 27-30	Mid-Atlantic Computer Show & Software Exposition	Hardware, software, accessories.	Convention Center Washington, DC	CompuShows P.O. Box 3315 Annapolis, MD 21403 (800) 368-2066 (301) 263-8044

Micro-to-mainframe: Before you settle for a simplistic solution, ask a few serious questions.



Choosing a micro-to-mainframe communications system is no game.

So before you lay around with "easy" solutions, ask some serious questions.

Will this product support full IBM Terminal Emulation?

Make sure the system can emulate remote batch and interactive IBM terminal systems.

Does the company offer a variety of products?

You should have your choice of stand-alone front-end processors, IBM PC or XT boards, or an OEM board. All ready to run on the most popular operating systems.

Can I get fast answers to my questions?

Insist on toll-free access to qualified service personnel before and after the sale.

What if I need a quick analysis of a problem?

Ask if the manufacturer has a Communications Test Center for product testing over public phone lines. And find out if the system has internal diagnostics.



Suppose something goes wrong with the unit?

The company should offer a 30 day money-back guarantee and a 12 month warranty that includes a free replacement unit.

What about future product development?

Make sure the products you're going to need soon will be available soon.

Who am I dealing with anyway?

How long have they been in business? The longer, the better.

How much is all this going to cost?

Here's a point of reference: Our own DataTalker product line will give you all the capabilities and services just described for as little as \$695. Complete. If you'd like to know more, contact our Marketing Support Group at 1-800-321-7785.



Providing Data Communications Solutions

Winterhalter, Incorporated
3853 Research Park Drive
P.O. Box 2180, Ann Arbor, MI 48106
313/662-2002 800-321-7785
TWX 810-223-2423
TELEX 234-216



DataTalker™

By Winterhalter, Incorporated

Winterhalter, Incorporated has been providing data communications solutions to major manufacturers of microcomputers and word processors since 1978. Our DataTalker front-end processors and PC boards are used by companies around the world, from start-up manufacturers to the Fortune 1000.

CIRCLE 185 ON READER SERVICE CARD

Now
available
for the
IBM PCjr.

PRODUCT REVIEW

SELECT Bilingual: ¿Usted Habla Español?

BY DAVID OBREGÓN

SELECT Bilingual Word Processor

Select Information Systems
919 Sir Francis Drake Blvd.
Kentfield, CA 94904
(415) 459-4003
List Price: \$395

Requires: 128K RAM, two
360K drives, PC-DOS 2.0.

“¿Como esta usted?”

“¿May bien, gracias!”

If the above is about all the Spanish you've used in the last few years, then *SELECT Bilingual* is more word processor than you'll need. Though it is a full-featured word processor in its own right, its primary benefits most probably will be felt by the growing number of companies with employees more fluent in Spanish than in English.

“SELECT Bilingual is intended for businesses with Spanish-speaking employees, or those doing business with Spanish-speaking firms,” says a spokes-

person for Select Information Systems, the software's producers. “Users can interact with the program in either English or Spanish, and create new documents, or edit existing ones, in either language from either language, regardless of their previous computer experience.”

SELECT Bilingual allows a document to be created by someone using the menu-driven commands in one—human—language, then later edited by someone else who prefers the commands and help screens offered by the program in its other language. The language of the document does not matter as its full range of editing, formatting, and printing functions can be accessed from English or Spanish for any text file.

The software uses single keystroke commands to perform the various functions expected of a word processor, separating functions such as ERASE and SAVE with the Esc key. Commands are listed at the top of the screen during the creation or editing of a document, and each function is called forth by its

initial—E for ERASE, C for COPY, and so forth. (In keeping with the program's penchant for mnemonic commands, in Spanish the same commands are B, for BORRAR, and D, for DUPLICAR.)

All this may sound clumsy, and indeed it takes up a lot of memory, but it works. The program's use of the conveniently located Esc key to switch modes quickly becomes second nature, even to this *WordStar* user.

The included “Teach/Tutor” can have a user working smoothly with the program within 90 minutes, in either language. Help screens, which summarize each listed function, are available with a single press of the H (for HELP in English mode) or G (for GUIA in Spanish mode), plus the first letter of the command in question. The total effect is to make the program remarkably easy to use, regardless of the primary language of the user.

SELECT Bilingual's two manuals, one each in English and Spanish, offer clear and concise instruction in the program's varied functions and complement the Teach/Tutor facility so that the user is working with the system quickly.

To print the range of special punctuation characters used in Spanish, the software makes use of the IBM PC keyboard's plus

sign (+) (to the right of the numeric keypad) as a Compose key. To create the upside down question mark (¿) used at the start of this review, for example, the user would hit the Compose key, then the Question Mark key. The new punctuation mark appears on-screen exactly as it would in print.

Among other features are the ability to print one document as a background operation while the user is editing a second, and the ability to display boldface or underlined words on-screen as either highlighted or underlined words (monochrome display) or in different colors (color display).

All these capabilities take up space in a system's memory—the program is on four double-sided diskettes, each filled almost to capacity, and the installation procedure actually recommends crasing some of the files on the working master disk to make room for the newly installed program. Two double-sided disk drives is a definite must, though for more effective use of the software's *Spell/Ortografia* spelling checker and Mail Merge utilities, a hard disk drive is strongly advised.

Still, for businesses where “¡Buenos dias!” is as common as “Good morning!” *SELECT Bilingual* can serve well as the word processor of choice. ■

How Sweet It Is

The newest computer chip on the market isn't made of silicon, doesn't contain any memory, and will mess up your PC chassis. But it does fit in your mouth and you'll probably remember it because this chip is made of chocolate.

The Chocolate Chip, from Chocolatek of San Diego, contains a double-dip (54 grams) of imported dark Belgian chocolate formed with great detail into a VLSI (Very Large Scale Interpretation) of the ubiquitous integrated circuit computer chip.

The form is modern but the chocolate itself is old-fashioned. The editors at *PC* thought it was good enough to raise the possibility that Very

Large Scale could also apply to users who attempted to add too many of these expansion devices to their systems. While the

chip may not hold 256K, it's certainly well over 256C (Calories, that is). When asked to reveal precisely how many, Bob Ker-



stetter, one of the chip's two creators, would only say, “too many.”

Looking to the future, A. Wasil, the chip's other block, says the company's marketing plan includes a European version, identical to the American one. Since taste in chocolate is incompatible across the Pacific, the Japanese version will require a more bitter blend. Chocolatek also has other computer related products in the works. “The transition to the 21st century will be much easier with a little chocolate on your face,” the company suggests.

The Chocolate Chip will be available for \$6 to \$8 at department stores. Chocolatek is at 4475 Mission Blvd., Sweet 211, San Diego, CA 92109, (619) 272-7720. ■

INCREDIBLY DIFFERENT Typing INSTRUCTOR™



Typing program. . . gets Gold Star. (PC Week)

Those in the market for true typing instruction would do well to look beyond the evidence of a name.

Virtuous names like Master and Tutor can cause a buyer to infer typing instruction where none may exist.

A unique exception is the **Typing INSTRUCTOR™**—a program whose benefits offer true typing instruction, rather than promises of it.

The **Typing INSTRUCTOR** from **INDIVIDUAL** is the first integrated typing program. It combines professional typing instruction with graphic capabilities to offer totally flexible, multi-function instruction featuring:

- Graphic Introduction to Typing Basics.

- 18 Independent, Interactive Key Lessons for Correct Finger Placement.
- Over 10 Practice Choices including Sentences and a Fast-action, Competitive Game of Chase.
- Informative Introduction to Word Processing.
- Individualized Progress Reports and Helpful Evaluation of Skills.
- Professional Typing Tests In Paragraph Form With Complete Statistics.

The **Typing INSTRUCTOR** has seemingly unlimited choices. You can use the Return or Space Bar. Choose a variety of typing material with different levels of difficulty. Type over 100,000 words. And move from one area of the program to any other at any time.

Being the leading creator of innovative training programs, **INDIVIDUAL** uses double key-stroking in each key lesson and employs reimprinting for correct key sequencing when you make an error.

But perhaps the most distinguishing characteristic of a true **Typing INSTRUCTOR** is its 100% buyer satisfaction. And by this standard none is more authentic than the **INDIVIDUAL Typing Instructor** — **ONLY \$49.95.**

To purchase your **Typing INSTRUCTOR** and other fine **INDIVIDUAL Training** programs, see your local IBM PC dealer or software retailer.

Other **INDIVIDUAL Training™**
The **INSTRUCTOR** \$44.95
Professor DOS \$59.95
Professor Pixel \$59.95
Tutorial Set \$94.95



Individual Software, Inc.
1163-I Chess Drive
Foster City, CA 94404

Dealer and Phone
Inquiries Welcome.
(415) 341-6116

Requires an IBM PC, PC XT, PCjr or IBM Compatible with 128k memory, DOS, one double-sided diskette drive and a color or monochrome display.

People in the News: "Jim Button"

PC-File designer disguises his identity, but now flaunts his special product

BY MARTIN PORTER

SEATTLE—Is Jim Button going legit?

The elusive denizen of "free" software—noted for his PC-File database program—has reevaluated his distribution methods, published "official" documentation, and is about to launch a series of new PC software titles, all of them available through mail order and for under \$50 each.

Advertisements for the products may even hit the trade magazines, and don't be surprised if you soon find the "people's software" as the latest entry on your dealer's shelf.

None of this is surprising by traditional software publishing terms. But there has been nothing traditional about the way Jim Button (an alias) has worked so far. PC-File (a PC Magazine reviewer recently called it "a meat and potatoes database...maybe the best money you'll ever spend") has been legitimately sold to over 6,000 clients. Button's yearly income from software alone is in "the 6-figure range." One of his biggest clients is the IBM Corp., which uses the program in several of its branch offices and research labs (the company paid Button a one-time fee to duplicate the program with impunity).

Button has a surprisingly good sales record for someone who has never advertised his product and still supplies documentation on the un-copy-protected floppy disk. He even offers free usage to PC users' clubs and authorizes anyone to copy it for "evaluation purposes."

Copy, Copy, Copy

However, Button isn't naïve about controlling the "unauthorized distribution" of the popular database. He estimates that there are over 50,000 copies of PC-File spinning in disk drives

throughout the world.

"It was never my intention to make money on it. I wasn't in the software business," he explained recently. However, the first edition of PC-File, released in July 1982, circulated throughout the Seattle, Washington area where Button lives and works. He saw that people were using the program but, more importantly, were calling



him up with improvements. That was when he decided to assume a pen name as well as take control of what was happening to his product.

"It was starting to snowball, starting to get away from me. I didn't want to lose my rights to the program and felt it was time to exert my copyright," he recalls.

He didn't anticipate what would happen next. In fact, he simply saw his "business" as a glorified hobby to pay for his "computer habit." He put a \$45 price tag on the product, and even included an invoice with the on-disk documentation along with an open appeal for software consumer decency.

Some Warning

"Please join the experiment," it reads. "If you believe in these ideals, your contribution is so limited to help make them work."

It worked. Even though he had been skeptical, and his wife "didn't think anybody would pay a penny for it," the orders began coming in.

It's a combination of the low price and the quality of the product, Button explains. "People want to encourage that. They figure they can remain honest for almost nothing."

Button receives more than checks in the mail. He received additional design advice from his enthusiastic customers, as if they had a share in the success of the product. Today the suggestions come in so frequently that Button has to revamp the product three times a year.

The next PC-File update (PC-File III.3) is due in October. The newest version contains improvements including a full-screen editor, a browse mode to view 20 records at a time, and global update and delete. The new "published documentation," which Button is offering separately for \$4, comes in a package of ring-bound pages that fit neatly into the IBM documentation binders. The printed documentation will now accompany an abbreviated on-disk tutorial.

Loving Users

"The documentation was originally just thrown together. But I got a lot of suggestions on it. I tuned the documentation like I tune the program," he admits.

"I have strong feelings about this aspect of the PC-File phenomenon. I realize that if I went into a locked room for 5 years, I couldn't have come up with a program as nice as this. A program needs the feedback. I give the users credit. Every change in the last few versions came from the user input."

Interestingly, the suggestions come in waves, as if the users have an emerging common

need. "With every new release I put to bed, I think I've done every neat thing anybody can think up. And then things like global update and delete come up. Two releases ago, nobody suggested it. Then, within a week, I had five suggestions. Go figure it out."

Follow Products

Button has stopped trying to figure it out. He has hired an employee to handle telephone calls and orders. He is especially grateful now for his anonymity, though he was willing to have his photo published in PC Magazine for the first time. And he is gearing up for his new software releases: PC-Graph, which will allow users to create a variety of graph forms from PC-File; PC-Dial, a communications package; PC-Calc; and PC-Type, a word processor.

With his mailing list of customers, he expects the new products to take off faster than PC-File did. Still, he hasn't quit his job in the Seattle area. His company won't let him tell who he works for either, though he explains it isn't Microsoft nor any other local software firm. PC-File was written in Microsoft BASIC, though originally for the Apple II.

Button does see impending competition from a new generation of "legitimately" distributed low-cost databases, but that should "make the high cost guys drop prices, as well."

Nor is he married to the idea of alternative distribution. If—or when—he sees the future closing in on his mail-order scheme, he would consider selling the product outright to a software publisher.

"I'm not a philanthropist. As long as I'm having fun doing what I'm doing it's all right. But I'm open to suggestions. I'm so open to suggestions that my brains are falling out."



Please judge this book by its cover.

Everything you need to know about MICROSYSTEMS is right there on the cover. It is, pure and simple, *The Journal for Advanced Microcomputing*. A professional resource that takes you far beyond the basics of most computer magazines.

MICROSYSTEMS is for sophisticated users and designers who need straightforward, no-frills input on advanced microcomputer programming and technology. People who create their own systems for important business, personal, scientific and educational applications.

Whether you use CP/M®, MP/M®, MS-DOS®, UNIX®, XENIX®, or OASIS—MICROSYSTEMS will provide you with a monthly package of expert tutorials on valuable modifications and special uses. The field's leading authorities will show you how to upgrade. Download. Modify. Debug. Interface. Patch. Speed up. Short cut. Customize.

You'll get more power, more versatility, more performance from your DOS for every information processing job. For example, here's the type of *high-level guidance* you can expect in the months ahead:

- How to access the wealth of free software available from Remote CP/Ms
- HP-GL: Add graphics to any computer system
- More WordStar mods for the Z-19
- Twenty-seven 16-bit DOS compared
- Reviews of four C compilers: BDS C, Small C, tiny c TWO™ and Whitesmiths C

**Save up to 31% on
THE JOURNAL FOR
ADVANCED
MICROCOMPUTING!**

- 488 Bus Tutorial: What the IEEE-488 GPIB bus does and how to use it
- Interfacing the Epson MX-80 printer via a parallel port
- Will solid-state drives replace the hard disk?
- Review of CompuPro's MPX-1 Multiplexer Channel

And there's more. Regular departments include industry news and insider's reports... The S-100 Bus... The Unix File... In the Public Domain... Book Reviews... New Products... plus the Software Directory, detailing newly available programs.

How high-level is MICROSYSTEMS? If you use computers in your profession, the cost of your subscription may be *tax-deductible*. And if you act now—while this New-Subscribers-Only offer is in effect—you can save up to 31%!

MICROSYSTEMS. When it comes to customizing software and adapting hardware, no one covers the field better.

Microsystems

P.O. Box 2930 Boulder, CO 80322

YES—Please enter my subscription to MICROSYSTEMS immediately at the NEW-SUBSCRIBERS-ONLY rate I've checked below:

- ☐ One year (12 issues) only \$21.97—I save 19%!
☐ Two years only \$40.97—I save 24%!
☐ Three years only \$55.97—I save 31%!

(Savings based on full one-year subscription price of \$26.97)

Check one:

- ☐ Payment enclosed
☐ Bill me later
 Charge my:
☐ MasterCard
☐ Visa
☐ American Express

Mr./Mrs./Ms. _____ (please print full name)

Company _____

Address _____

City _____

State _____ Zip _____

Card No. _____ Exp. Date _____

Add \$5 a year in Canada, all other foreign add \$6. Please allow 30 to 60 days for delivery of first issue.

ARE YOU TIRED OF FLOPPY EXCUSES?

QuadDisk has all the answers

When you have QuadDisk, Quadram's new Winchester hard disk system, you can leave all the limitations of floppy disks behind. Because QuadDisk does a lot more for you. A lot faster. And in the same amount of space.

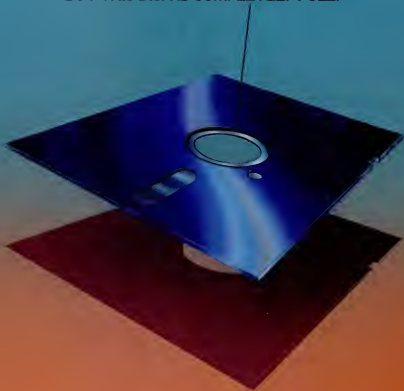
Maximum storage in minimum space
QuadDisk actually turns your IBM or

compatible into a micropowerhouse. Without turning your computer into a main frame.



QuadDisk is designed to be fully integral. It installs quickly in the same space as your second 5 1/4" floppy drive, once it's in, you'll hardly even know it's there.

"EXCUSE ME, I REALLY HATE TO
BOTHER YOU AT A TIME LIKE THIS
BUT THIS DISK IS COMPLETELY FULL."



A Choice of 5 to 65MB

QuadDisk comes in megabyte capacities, for all the on-line storage space you need. If you're interested in added data security and flexibility, there's QuadDisk with removable cartridges for up to 5MB of off-line storage.

It's menu-driven so you can copy, erase, rename, run and manipulate files and



QuadDisk comes complete with powerful menu-driven software. You can maintain files and check disk status easily.

programs at the touch of a key. Without any complicated DOS commands.

A fast worker

You can count on QuadDisk to make

fast work of any task. Features like direct memory access, sector interleaving and cache buffering let you get the job done quicker than ever before. And with multi-tasking,



COMPAQ

EAGLE

QuadDisk lets your computer perform up to 9 different tasks at once.

For added safety, QuadDisk contains an error correct code that will automatically correct any bad information on the disk surface during the read/write function.

Quadram Quality

Last, but not least, QuadDisk is backed by the Quadram Quality seal. The mark of dependability and performance from the leader in microcomputer enhancements.

Visit your local dealer today and ask to see QuadDisk in action.

When you watch it perform, you won't flip flop on the issue of hard disks any longer. You'll choose QuadDisk by Quadram.



QuadDisk™ by Quadram™



4355 International Blvd Norcross, GA 30093
(404) 923-6656/TWX 810-766-4915 (QUADRAM NCPS)

IBM® is a registered trademark of International Business Machines Corporation.
COMPAQ® is a registered trademark of COMPAQ Computer Corporation.
EAGLE® is a registered trademark of Eagle Computers, Inc.

© Copyright 1984 Quadram Corporation.
All rights reserved.

How to cure the, "Presentation must be ready tomorrow" headache:



Authorized Dealerships available.

Use one Penpad tablet.

It has great slide effects. Now, anyone can prepare 35mm slides, overhead transparencies, or a whole presentation on a video monitor by using the Penpad.

Penpad is the only graphics tablet in the world that lets you run your PC with one hand. Draw, paint, plot, cut, paste, and label your work in the easiest, most natural way possible—with pen and paper. Capture and personalize images from Lotus[®] 1-2-3 and others. It can read your writing and display it in dozens of type styles.

With our custom graphics software, Pendraw[™], an easy-to-use 4-color program, or our advanced, 16-color VIDEOGRAM[™], you can do in hours what once took days or weeks.

There is no better remedy for the pains of an upcoming presentation, so take two aspirins and call your IBM or Compaq dealer in the morning.

PENCEPT

Lotus[™] 1-2-3 is a trademark
of Lotus Development Corp.

Pencept, Inc. 39 Green Street, Waltham, MA 02154 617/893-6390
In Canada call, Scarsdale Technologies (416) 441-1900

HIGH TECHNOLOGY AT AFFORDABLE PRICES

Dot Matrix Printers

C. Itoh Prowriter (8510)	\$ 369.99
C. Itoh Prowriter-2 (136 col.)	589.99
C. Itoh Prowriter BPI	439.99
C. Itoh HotDot	509.99
C. Itoh HotDot-2 (138 col.)	729.99
DMX-80 (Pentason 1090)	259.99
Epson RX/FX/LO Series	CALL
Infomur Riteman	309.99
Mannesmann Tally Sprint-80	329.99
Okidata Microline 92	469.99
92 w/IBM graphics compatibility	469.99
Okidata Microline 93	699.99
93 w/IBM graphics compatibility	699.99
Okidata Microline 64 Step II	889.99
NEC P3 Pinwriter (136 col.)	CALL
Star Micronics Gemini 10X	299.99
Star Micronics Gemini 15X	429.99
Star Micronics Delta 10	439.99
Star Micronics Delta 15	599.99
Star Micronics Redux 10/15	CALL
Toshiba P-1351	1699.99
Toshiba P-1340	CALL

Letter-Quality Printers

C. Itoh A-10 Starwriter (18 cps)	\$ 549.99
C. Itoh F-10 Starwriter (40 cps)	1079.99
C. Itoh F-10 Printmaster (55 cps)	1379.99
Diablo Printer Series	CALL
NEC 2010/2030 (18 cps)	749.99
NEC 2050 for IBM-PC (18 cps)	899.99
NEC 3530 (33 cps)	1429.99
NEC 3530 for IBM-PC (33 cps)	1779.99
NEC 7730 (50 cps)	1939.99
Qume Sprint 11/40/55	CALL
Qume LetterPro 20	709.99
Silver Reed EXP-770 (25 cps)	979.99
Silver Reed EXP-550 (17 cps)	559.99
Silver Reed EXP-500 (12 cps)	439.99
Silver Reed EXP-400 (10 cps)	329.99
SCM Memory Correct III (12 cps)	589.99
Star Micronics PowerType (18 cps)	CALL

Modems

Hayes Smartmodem 300	\$ 239.99
Hayes Smartmodem 1200	559.99
Hayes Smartmodem 1200B	479.99
Novation SmartCat 103, 300bd	169.99
Novation SmartCat 212, 1200bd	409.99
Novation Access 1-2-3	409.99
USR Password, 1200 baud	369.99
USR Password, 300 baud	159.99
Volsmodem, 300 baud (IBM-PC)	69.99
9-wire Modem Cable (1-8 & 20)	29.99
Multi-Line Junction Box	29.99

Monitors

Amdak 3003 (green)	\$ 144.99
Amdak 300A (amber)	159.99
Amdak 310A (TTL amber)	179.99
NEC JB-1201G (green)	159.99
NEC JB-1205M (amber)	159.99
Princeton Graphics SR-12	CALL
Princeton Graphics HK-12	509.99
Princeton Graphics Max-12	199.99
Quadram QuadChrome	529.99
Roland DG-121 (green/amber)	149.99
Roland DG-122 (TTL green or amber monochrome, w/cable)	179.99

IBM-PC Peripherals

64K Memory (4164/200ns) 9/pkg.	\$ 79.99
Alloy 41 MB Disk/Tape System	CALL
Alloy PC Backup System	CALL
AST SixPak Plus 64K	299.99
AST SixPak Plus 256K	519.99
AST SixPak Plus 384K	639.99
Columbia Computer Systems	CALL
Harcules Graphics Card	379.99
Kaytronics 5151 keyboard	219.99
Keytronic 5151jr keyboard	219.99
Microsoft Mouse (parallel)	149.99
Mouss Systems PC-Mouse (3.0)	219.99
Paradise MultiDisplay	479.99
Quadram Memory Board	CALL

NEW! Quadram 384K Quadboard	CALL
Quadram Quad 512 + (64K)	239.99
Quadram Quad 512 + (512K)	669.99
Quadram QuadColor-1	219.99
Quadram QuadColor-2	229.99
Quadram QuadVus (monochrome)	CALL
Quadram QuadDisk	CALL
Quadram Parallel Card, RS-232C Card or Clock/Calendar Card	79.99
Quadram QuadLink	509.99
Quadram QuadLink (Columbia)	539.99
Quadram QuadLink (Compag)	539.99
STB Graphics Plus II	479.99
STB Memory Boards	CALL
STB Super I/O	169.99
STB Super RIQ (84K)	299.99
STB Super RIQ Plus (64K)	319.99
Tandon TM 100-2 DSDD	229.99
Tren Cygnus I/O (clock/parallel)	149.99
Tren Cygnus I/O (clock/RS-232)	169.99
Tren MultiFunction Board	CALL
TG Joystick	59.99

Accessories

Printer Cables	\$29.99
80 Column Printer Stand (metal)	39.99
132 Column Printer Stand (metal)	49.99
2-Way Printer Switch Box	109.99
4-Way Printer Switch Box	159.99
DSDD Diskettes	CALL
Curtis Monitor Stand w/cables	119.99
Curtis Monitor Stand w/o cables	64.99
Tilt/Swivel Monitor Stand	39.99
Curtis System Stand	24.99
EPD Lemon/Lime/Orange/Peach	CALL
File-n-File Disk Boxes	CALL
Kensington PC-Saver	45.99
Kensington Micro-Saver	59.99
Quadram Microfaser Print Buffers	CALL
Trace Sound Trap (80 col)	129.99
Trace Sound Trap (132 col)	189.99

ADVANCED LOGIC SYSTEMS • ALLOY • AMDEK • ANADEK • AST • CCS • CARDICO • C. ITOH • COMREX • COLUMBIA DATA PRODUCTS
CURTIS MANUFACTURING • DATA PRODUCTS (IDS) • DIABLO • DTC • EAGLE COMPUTER • EASIFEED • EPO • EPSON • FRANKLIN COMPUTER
HAYES MICROCOMPUTER PRODUCTS • HERCULES COMPUTER TECHNOLOGY • INFORUNNER • INTERACTIVE STRUCTURES • JMM
JUKI • KENSINGTON MICROWARE • LEADING EDGE • LO • MANNESSMAN TALLY • MA SYSTEMS • MICROSOFT • MILFORD NULL MODEM
MOUSE SYSTEMS • NOVATION • NEC • OKIDATA • ORANGE MICRO • PARADISE SYSTEMS • PERFECT DATA • PRINCETON GRAPHICS
QUADRAM • QUME • QCS • RANA SYSTEMS • ROLAND DG • SILVER REED • SMITH-CORONA • STAR MICRONICS • TANDON • TECMAR
TITAN • TOSHIBA • USI • US ROBOTICS • VIDEK

The right place for the right price

If you live in the New England area (or plan to visit there), you should drop by our **DISCOUNT COMPUTER SHOWROOM**. We're about one hour's drive from Boston, the ocean or the White Mountains. From Boston, just go up Route 3 to Nashua, NH, and take Exit 7W (Route 101A). We're 5.1 miles from that exit, in Amherst, NH. Take the next right after you see the Dealer Shoe factory outlet store.

In fact, we're near a lot of New Hampshire's factory outlet stores, and with no sales tax you can save a bundle on computer equipment, shoes and whatever else strikes your fancy. We have several systems on display, as well as printers, modems and monitors, all at the same prices you see in our ads. And if you can't fit a purchase into your car, don't worry...we'll ship it free anywhere in the 48 contiguous states.

No matter where you live—Boston or San Francisco—you don't have to strike out into the wilderness to save money. Take a short drive or drop us a line for the best advice and price on IBM-PC peripherals and IBM-PC compatible computers.

SHOWROOM HOURS: 10-6, Mon-Fri, 10-5 Saturdays



TECHNICAL SALES DESK

(603) 881-9855

TOLL-FREE ORDER DESK

(800) 343-0726

Hours: 9:00 to 5:30 EST, Mon-Fri

- FREE UPS ground shipping on all orders over \$50 (under \$50 add \$2.50 for handling)
- Shipments fully insured at no extra charge
- MasterCard, VISA, American Express, Diners Club & Carte Blanche credit cards accepted
- No surcharges on credit card
- Credit cards are not charged until your order is shipped from our warehouse
- CODs accepted up to \$1000 (add \$10 for COD handling). Payable with certified check, money order or cash.
- Full manufacturer's warranty on all products sold
- 1-year extended warranty service is now available for many products (just ask us)
- Sorry, no APO/FPO or foreign orders



HIGH TECHNOLOGY AT AFFORDABLE PRICES

THE BOTTOM LINE

MILFORD, NH 03055-0493 □ TELEPHONE (603) 881-9855



Now you don't have to sacrifice print quality for speed.

The Canon Impact Matrix Series Printers.



High speed and high quality in one functional, compact unit. That's what Canon's Impact Matrix Printers offer you.

They print hard copy at a rapid 160 characters per second. While in the double pass mode you get an impressive, high-density 23 X18 dot matrix that gives near letter quality printing suitable for word processing.

Canon's unique technology has also dramatically reduced bothersome clatter down to a muted noise level of less than 60dB.

Even at high speed.

And that, unlike many other impact matrix printers, makes them a pleasure to work with.

Plus there's limitless flexibility with the optional down-loading function that lets you print

whatever character fonts your host computer can create. As well as a choice of four different character styles (all printable on the same line) that you can enlarge or condense.

The Impact Matrix Series Printers give you a convenient choice of special paper widths—the PW-1080A for 80-character column printout and the PW-1156A for 156-character column.

Exceptional quality and high speed.

The Canon® Impact Matrix Series Printers give you the best of both worlds.

For more information:
Call 1-800-323-1717, Ext. 300.
(In Illinois call 1-800-942-8881, Ext. 300.)
Or Write Canon U.S.A., Inc.,
Printer Division, P.O. Box CN 11250,
Trenton, N.J. 08638.

Canon Printer Division
CIRCLE 141 ON READER SERVICE CARD

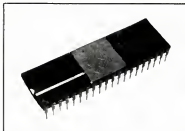
© 1984 Canon U.S.A., Inc.

THE 8087 IS IN STOCK!

Micro Ware is the world's leading retailer of 8087s. We also have the most accurate statistics on chip reliability. They are: .01% infant mortality, .00% adult mortality and .02% 8088 incompatibility. As for ease of installation, we have never had a customer return a chip because of bent pins. We are so confident that you will be able to successfully install and use the chip that we offer a 180-day warranty with every chip we sell. That's 90 days more than anyone else!

To support the 8087 we stock the largest selection of 8087 software anywhere. This includes: three FORTRANs, three PASCALS, APL, Intel's ASMB6, PL/M-86, several CS, 87BASIC, 87MACRO and MATRIXPAK. For real time or multi-user applications we offer RTOS™ - our implementation of Intel's iRMX executive. Our new products include a professional debugger with 8087 support, an interface library which enables MS Fortran users to call the IBM Basic

Compiler Library, and a translator that converts object modules into readable assembly language files. If you have a question about which computer, language, compiler, operating system or application package is best suited to your problem, we can answer it. Just call: Information and Orders— 817-746-7341 University, Corporate and Government Buyers— 817-746-7364



MicroWay™ 8087 Support

87FORTRAN/RTOS™ - our adaptation of the Intel Fortran-86 Compiler generates in line 8087 code using all 8087 data types including 80-bit reals and 64-bit integers. The compiler uses the Intel large memory model, allowing code/data structures of a full megabyte, and supports overlays. Includes RTOS and support for one year \$1350

87PASCAL/RTOS™ is Intel's ISO-Standard Pascal with 8087-8088 exceptions. These make it possible to use all the 8087 data types directly, while generating modules in one of the three Intel Memory Models. Includes RTOS and support for one year \$1350

RTOS DEVELOPMENT PACKAGE includes 87FORTRAN, 87PASCAL, PL/M-86, UTILITIES, TX Screen Editor and RTOS... \$2500

RTOS— REAL TIME MULTI-TASKING/ MULTI-USER EXECUTIVE

RTOS is a Micro Ware configured version of iRMX-86. Includes ASM-86, LINK-86, LOC-86, LIB-86, and the ROM Hex Loader \$600

MWS-286™ Configured to your specifications, our computer runs RTOS-286 or XENIX. Includes one Intel compiler, seven slot multibus chassis, hard disk, streaming tape backup and Intel Service Contract. Six to twenty times faster than your PC CALL

OBJ-ASM™ - a multipass object module translator and assembler. Produces assembly language listings which include public symbols, external symbols, and labels commented with cross references. Ideal for understanding and patching object modules and libraries for which source is not available \$200

PC TECH JOURNAL REVIEW: "The Micro Ware package is preferable... it executes the basic operations more rapidly and Micro Ware provides a free update service."

87BASIC™ includes patches to the IBM Basic Compiler and both runtime libraries for USER TRANSPARENT and COMPLETE 8087 support. Provides super fast performance for all numeric operations including trigonometric, transcendental, addition, subtraction, multiplication, and division \$150

87BASIC/INLINE™ generates inline 8087 code! Converts the IBM Basic Compiler output into an assembly language source listing which allows the user to make additional refinements to his program. Real expression evaluations run five times faster than in 87BASIC \$200

87MACRO™ - our complete 8087 software development package. It contains a "Pre-processor," source code for a set of 8087 macros, and an object library of numeric functions including transcendental, trigonometric, hyperbolic, encoding, decoding and conversions \$150

87DEBUG™ - a professional debugger with 8087 support, a sophisticated screen-oriented macro command processor, and trace features which include the ability to skip tracing through branches to calls and software and hardware interrupts. Breakpoints can be set in code or on guarded addresses in RAM \$150

FOR→BAS™ - a library of interface routines which allow MS Fortran programs to call the IBM Basic Compiler library and access features such as the RANDOM NUMBER GENERATOR, SOUND, PLAY, DRAW and SCREEN commands \$150

8087-3 CHIP.....\$175
including DIAGNOSTICS and 180-day warranty
64K RAM Upgrade.....\$47.50

87/88GUIDE - an excellent tutorial on writing 8087 code and interfacing it with compilers. Full of code that runs! \$30

MATRIXPAK™ manages a MEGABYTE! Written in assembly language, our runtime package accurately manipulates large matrices at very fast speeds. Includes matrix inversion and the solution of simultaneous linear equations. Callable from MS Fortran 3.2, 87MACRO, 87BASIC, and RTOS each \$150

MICROSOFT FORTRAN 3.2.....\$230

MICROSOFT PASCAL 3.2.....\$209
These IEEE compatible compilers support double precision and the 8087

MICROSOFT C COMPILER includes Lattice C and the MS Librarian \$350

LATTICE C with 8087 support.....\$350

SCO XENIX™.....\$95

Unsource VENIX/86™.....\$800

FL0AT87 for MS C.....\$125

SuperSoft Fortran 86.....\$299

Computer Innovations C86.....\$445

STSC APL+PLUS/PC.....\$500

TURBO PASCAL.....\$45

TURBO PASCAL with 8087 Support.....\$85

HALO GRAPHICS.....CALL

GRAPH-MATIC.....\$125

ENERGRAPHICS.....\$295

Professional BASIC.....\$205

Ridger Object Design Program.....\$300

COSMOS REVELATION.....\$50

SuperCek III with 8087 Support.....CALL

MAYNARD WS1 HARD DISK.....\$95

MAYNARD WS2 HARD DISK.....\$170

256K RAM Chips.....CALL

MAYNARD ELECTRONICS Boards.....CALL

**NO CHARGE FOR CREDIT CARDS
ALL ITEMS IN STOCK
CALL FOR COMPLETE CATALOG**

IBM PC is a registered trademark of IBM Corp. 8087, iRMX-86, LINK-86, FORTRAN-86, ASM-86, LOC-86, PL/M-86 and LIB-86 are trademarks of Intel Corp. 87FORTRAN/RTOS, 87PASCAL/RTOS, 87BASIC, 87MACRO, MATRIXPAK, 87/88GUIDE, 87BASIC+ and MicroWay are trademarks of Micro Ware, Inc.

**Micro
Ware**

P.O. Box 79
Kingston, MA
02364
(617) 746-7341

**You Can
Talk To Us!**

More PC Enhancements

ACP Key Values for your
IBM PC™ and compatible computers



• The Only PC Intelligent Modem that allows you to switch from Voice to data Communications.

Most MODEMS will let your computer talk. The Buzcomp 1200 Baud MODEM allows you to transfer files and verify via telephone that they were properly received. You just plug your regular telephone handset into the back of your IBM PC/XT™.

PC Intellimodem 1200 \$439.00

• 10M Byte Hard Disk for the IBM PC.

Now you can add 50% more capacity than the XT™. Just plug it in and it is ready to run. It is compatible to both the PC and the XT. Comes complete with controller card, data cable and internal mounting hardware. Requires no special software and will boot directly under DOS 2.0.

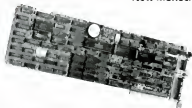
Internal 10M Byte Hard Disk with Controller \$995.00



• DYNAFRAME Hard Disk with Back-up Option and Expansion Slots.

The DYNAFRAME by Vista is the ultimate add-on device for the IBM PC. If you are ready to add Hard disk to your IBM PC this is the optimum solution. We are offering the minimum configuration which consists of the DYNAFRAME IBM PC matching chassis, 10M bytes of Hard Disk and Controller, 130 watt switching power supply, and eight slots of expansion capability. If you desire back-up can be added later, either the Syquest Removable Hard Disk or the Cipher cartridge data streamer. This product is constructed with the highest quality possible — it is much more than a sheet metal box with a drive thrown in.

DYNAFRAME with 10M Bytes \$2499.00



• Add Speech to Your PC.

For the past several years Street Electronics has been the leading manufacturer of speech products. Their ECHO™ Speech technology is now available in the CRICKET™. The CRICKET has an RS-232C Serial Interface. Compatible with the PC and PCjr. Software included creates sound effects, music, natural voice, (over 700 words supplied) and Robot voice. It has its own speaker and jack for headphones or stereo. The CRICKET is also compatible with the "Music Construction Set" by Electronic Arts.

Cricket for PC or PCjr. \$135.00

• MISCELLANEOUS PTI

Back-up power supply up to 30 minutes stand-by power. Compatible with most micros. \$328.00

TRANSEND

PC Modem card 1200 Baud \$439.00

PROMETHEUS

ProModem 200/1200 Baud \$469.00

VERBATIM

5 1/4" Head Cleaning Kit \$ 10.95

Disk Drive Analyzer \$ 29.00

TITAN

Accelerator PC (8086 plus 128K Ram) \$745.00

ERGO-VISION

Anti-glare screen. We have evaluated several and this screen gets top rating for the IBM. \$ 39.95



64K
rams

Set of 9 only \$50.

• New Monochrome Graphics Board from AST.

AST has the Optimum Solution to Lotus 1-2-3 graphics on the IBM PC Monographic Monitor. It increases the resolution from 640x200 to 720x348 and eliminates eyestrain caused by the IBM graphics adapter. You also get a parallel printer port, clock/calendar w/battery back-up and options include serial port. Now in stock at ACP.

AST MonoGraphic Plus \$445.
Optional serial port add \$35.00

• Best Bargain Yet for Top Quality Color Monitors!

SANYO

13" Color RGB Monitors with Audio. Ideal for IBM PC and compatibles. Both models have selector switch to turn your color monitor to green only. Take your choice of medium resolution with 5MHz, 340x230 dots and 1000 character display. Or High Resolution with 7MHz, 480x240 dots and 2000 character display.

Sanyo 6500 Medium

Resolution \$269.00

Sanyo 7500 High

Resolution \$389.00

ORDER NOW.

30 day money-back trial
We have no surcharges for Visa or Mastercard. One Day Service Available.

Add 3% Shipping and handling for UPS. Retail prices may vary. California residents add 6% Sales Tax.

(800) 854-8230

Toll Free or

(714) 558-8813



1310 E. Edinger Unit P
Santa Ana, CA 92705
TWX 910 595 1565
Since 1976

*All brand names are trademarks.

DIAMOND DELIVERS!

The Total Solution
Full Service • Full Support
Low, Low Prices

This Month's Packaged Specials

Wordstar Pro Pack/
Lotus 123 \$689

Wordstar Pro Pack/
Lotus 123/dBase II \$1039

dBase II/Quickcode
Wordstar/Mailmerge/
Correctstar/Star Index \$569

Wordstar
Lotus 123
Multimate \$369

Multimate/Lotus 123 \$619

Microsoft Word/
Mailmerge/Mouse \$319

Mailmerge/Correctstar/
Star Index \$189

Easywriter II /Speller II /
Mailer II \$199

R:Base 4000
Multiplan
Symphony \$329

dBase II
Volkswriter Dlx
Supercalc 3 \$179
\$219

Alphatech Software
APPLE II-IBM CONNECTION
DATA BASE MANAGER II \$250 \$139
\$295 \$199

Johnson-Tate
FRIDAY \$650 \$349

Concord
CONCORD 3 \$150 \$ 99
\$195 \$125

CompuLink
HOME ACCOUNTANT
ULTRAPLE \$195 \$105

MicroLink
CROSTALK XVI \$400 \$249
\$350 \$229

Digital Research
PASCAL MT + 86 \$300 \$135
CONCURRENT CPM 86 \$110 \$ 39
C BASIC 86 \$ 60 \$ 39

PERSONAL BASIC
CPM 86 \$400 \$229
ACCESS 86 \$ 99 \$ 60

ACCE 86 MGR
DISPLAY MGR
DR LOGO \$350 \$285
PC DOS LANGUAGES \$300 \$219

One-Link
MARKET ANALYZER
MARKET MANAGER \$195 \$119
\$150 \$100

Financial
FINANCER II
TAX SERIES \$295 \$189
\$295 \$199

File & Option
QUICKCODE
GRAPHX \$ 99 \$ 59

Harvard Software
HARVARD PROJECT MANAGER \$295 \$279

Wordstar
Lotus 123
Multimate

Information Unlimited
EASYSPELLER II
EASYMAILER
GENERAL LEDGER
ACCOUNTS RECEIVABLE
INVENTORY CONTROL
PAYROLL \$100 \$ 59
\$100 \$ 59
\$295 \$299
\$295 \$299
\$295 \$299
\$145 \$375

Lexipack
SPELLBENDER \$495 \$275

Lexipack
LATTICE C COMPILER \$595 \$315

Lexipack
VOLKSWRITER \$195 \$119

Micro Data Base
KNOWLEDGEMAN \$500 \$329

MicroLink
MAIL MERGE \$250 \$135
INFOSTAR \$495 \$299
CORRECTSTAR \$195 \$ 99
PLANSTAR \$295 \$299
INFOSTAR/STARBURST \$195 \$ 99
STARBURST \$200 \$ 99

MicroLink
MOUSE \$195 \$139
WORD/MAILMERGE \$175 \$249
WORD/TOOL FINANCIAL \$100 \$ 59
MULTITOL BUDGET \$160 \$ 99
FINANCIAL COMPILER \$200 \$209
PORTMAN \$250 \$226
C COMPILER \$500 \$345

MicroLink
DOLLARS & SENSE \$195 \$109

Professional Software
WORD PLUS WOODS \$495 \$329

\$245
Scall
\$299

LIST SALE

\$100 \$ 59

\$100 \$ 59

\$295 \$299

\$295 \$299

\$295 \$299

\$145 \$375

\$495 \$275

\$595 \$315

\$195 \$119

\$500 \$329

\$250 \$135

\$495 \$299

\$195 \$ 99

\$295 \$299

\$195 \$ 99

\$200 \$ 99

\$195 \$139

\$175 \$249

\$100 \$ 59

\$160 \$ 99

\$200 \$209

\$250 \$226

\$500 \$345

\$195 \$109

\$495 \$329

Resonance
PROKEY \$125 \$ 85

Resonance Publishing
PFS REPORT \$140 \$ 95

PFS FILE \$140 \$ 85

PFS GRAPH \$140 \$ 95

PFS WRITE \$295 \$159

Resonance
SUPERCALC 2
SUPERWRITER \$425 \$299

Supersoft
FORTRAN \$375 \$299
\$250 \$199

VisiCorp
VISIWORD
VISICALC IV \$395 \$266
\$266 \$266

AST Development
6 PAK PLUS-64K
ALL OTHER AST PRODUCTS \$399 \$266

Archie Software
SIGNALMAN MARK XI \$699 \$499
\$599 \$429

Hayes
SMARTMODEM 1200
SMARTMODEM 2200 \$680 \$489
\$489 \$219

Quadrant
QUADLINK \$275 \$266
QUADCOLOR \$266 \$266

QUAD
QUADBOARD EXP. TO 384K \$399 \$269

Quadrant
QUADBOARD EXP. TO 384K \$499 \$355

Quadrant
QUADPHICS CARD \$ 57

Quadrant
MEMORY CHIPS (64K)

- Special Corporate Incentives
- Cumulative/Quantity Discounts
- Same Day Shipment
- Overnight Delivery Available
- Purchase Orders Accepted From Qualified Organizations
- IBM, CPM, Apple* formats
- Expert Technical Assistance
- Full Product Guarantees
- Visa, M/C, Amer. Exp.
- Free UPS Surface w/Ppd Check

TO ORDER
CALL TOLL-FREE
1-800-227-0545

Software Specialists
For The IBM PC

Diamond Software Supply

484 Lake Park Ave., Suite 123 Oakland, CA 94610

For price quotes, information, or in California call 1-415-893-7676. We credit your order for the call.

Technical Department (415) 893-7676 International Telex 336139 (attn: 149)

IBM is a trademark of International Business Machines

CPM is a trademark of Digital Research

Apple is a trademark of Apple Computer Inc.



CRAFTSMEN OF THE NEW TECHNOLOGY.
BEST PRICES WITH QUALITY SUPPORT* ON SOFTWARE AND HARDWARE.

ORYX SYSTEMS

QUALITY DISCOUNTS

SOFTWARE

Alpha Software	
Data Base Manager I.....	\$ 129
Typefaces.....	79
American Internat'l Communications	
Tin-A-Syst.....	\$ 199
Gram-A-Syst.....	199
Advanced Analytics Technology	
The Reporter.....	\$ 22
Ashdon-Tate	
IBM/PC Reference Encyclopedia.....	\$ 55
ATI	
All Training Programs.....	\$ 60
Autodesk	
Autocad.....	Call
Bal	
Multi-job (Runs nine programs at once).....	\$ 145

d-BASE II CORNER

Anderson-Bell
Abstat..... \$ 289

Ashdon-Tate
d-Base II..... Call
d-Base III..... Call
FPL..... \$ 410
Friday..... 179

**Better Business
Systems, Inc.**
d-Base II
(writes checks)..... \$ 75

**Data Based
Systems**
dNAMES..... \$ 95

Fox & Geller
aGraf..... \$ 215
Quick Code..... 175
D-URL..... 62

**Global
Technologies**
dBCINK..... \$ 49

Human Soft
d-Base Plus..... \$ 90

Sensible Designs
D-Programmer..... \$ 199

Software Banc
Advanced d-Base II
User's Guide..... \$ 27

Report Writing
w/ purchase of
d-Base II..... \$ 10

*All above available
on PC-DOS

BPI	
Personal Accounting.....	\$ 139
Best Programs	
PC Fixed Asset System.....	Call
Cdex	
All Training Prog's.....	\$ 52
Control Point	
Copy II PC.....	\$ 34
Compview	
Vector CP/M 86.....	\$ 130
Visual.....	130
Systan.....	\$ 99
Continental Software	
The Home Accountant.....	\$ 89
Small Business Acc'l.....	155
PC Combo Pak (Box Activity/Home Acc'l).....	\$ 169

Decision Resources
Chartmaster..... \$ 289

Digital Research
Concurrent CP/M 86..... \$ 225

CP/M-86..... \$ 49
Fiscal MT+ 86..... \$ 375

CP/M (w/SP)..... \$ 385
Fiscal MT+ (PC DOS)..... 135

C Basic 86..... 240
C Language/Compiler..... 245

DR Logo..... \$ 99
Personal Basic 86..... \$ 115

PL/1-86..... \$ 499
Others..... Call

Daw Jones
Market Analyzer..... \$ 245

Market Manager
Spreadsheet Link..... 199

Investment Evaluator
Eco-Soft..... \$ 259

Emerging Technology
Eds (editor)..... \$ 139

Words (formatter)
Both..... 269

Enertronics
Energraphes..... \$ 265

Fastware
The file thought
organizer..... \$ 245

Financier Inc.
Financier II..... \$ 119

File Series..... 105
Fox & Geller
Grafax..... \$ 199

Grafax Har
(8 base 4000)..... \$ 215

Harvard Associates
PC Logo..... \$ 129

Harvard Software
Project Mgr..... \$ 299

PCjr.

Please call us
regarding products
for the IBM PCjr.

LOTUS 1-2-3 CORNER

CONSUMER SOFTWARE, INC.	
Auditor (proofing tool).....	\$ 85
LIGHTHOUSE SOFTWARE	
Key I (Data Management for 1-2-3).....	\$ 149
NATIONAL TRAINING SYSTEMS, INC.	
Putting 1-2-3 To Work (Eight application templates on diskette).....	Call
PHOENIX CONSULTING GROUP	
SP/US (Financial planning and forecasting).....	Call
STRATEGIC SOFTWARE SYSTEMS, INC.	
Strateline V.....	\$ 195
TELLIUM COMPUTER	
Visual.....	\$ 79
Lotus Shell for Visual.....	39

Hayes
Smartcom II..... \$ 89

Heritage
Smartkey II..... \$ 75

Individual Software
Instructor..... \$ 35

Practical DOS..... \$ 47
Practical Pascal..... 75

Innovative Software
TIM IV..... \$ 275

Free Graphics..... \$ 229
Living Videotext
Think Link (256K)..... \$ 139

MDBS, Inc.
Knowledge Man (Spec
w/ K-Mon, R-Plan, K-Graph)..... \$ 359

Micro Pro
WordStar..... \$ 265

Initiator..... \$ 265
Starburst..... \$ 149

Post-WPS-MM-SL-CSI..... Call
Micro Rim
Report Writer..... \$ 119

R-Base..... \$ 299
R-Base Cloud..... Call

Microsoft
MultiMath/MSump..... \$ 179

Paradigm Comp (DOS)
Project..... 229

C Compiler (DOS)
Basic Compiler (DOS)..... 249

Multiplan MS-DOS..... \$ 149
Word..... \$ 229

Word w/ Mouse..... \$ 299
Others..... Call

Microstuf
Crosstalk..... \$ 109

Morgan Computing
Professional Basic..... \$ 299

Trace 86..... 99
**Mosaic/Graphic
Software**
Super Chartman II..... \$ 299

Chartman IV..... 199
Both II and IV..... 250
Integrated &..... 369

North American

Antwer
(Database Prog.)..... \$ 159

Memory Shift..... 79
Northwest Analytical
Stat Pak..... \$ 365



PEACHTREE CORNER

Back to Basics
Acct g System..... \$ Call

Home Software
Library..... \$ Call

Peachtree 4
(GL, AP, AR)..... \$ 249

**Series 8 (GL, AP, AR,
Sales Inc, Inv, Control,
Job Cost, Client Port,
& Acct..... each mod \$ 389**

Norton-Lambert

Lync..... \$ 129
Oasis
The Word Plus..... \$ 110

Font & Style..... 99
Open Systems
Acctg Financ Programs..... \$ 449

PC Software
PC Cryan..... \$ 36

Create-a-base..... 60
Peter Norton
Utilities..... \$ 55

PBL Corp.
The Personal Investor..... \$ 129

**PowerBase
Systems, Inc.**
Powerbase w/
DATAZOOM..... \$ 325

SPI
Open Access..... \$ 399

Satellite Software

Word Perfect w/ Sp..... \$ 299
Others..... Call

Software

Fancy Form..... \$ 150
Software Arts
TKI Solver..... \$ 279

Applic Prog for TK..... \$ 79
Software Publishing
PFS-Report..... \$ 79

PFS-File, Graph, Write..... 89
PFS Access..... 79

Software/

Multimate Systems Inc.
Multimate (WP)..... \$ Call

Sordam

Supercalc III..... \$ 249
Super Writer..... 199

Star Software

Legal Timekeeping
Billing & Accts..... \$ 787

Accounting Partner..... 289
Supersoft
Fortran IV PC/DOS..... \$ 279

or 8086..... \$ 279
8087 Support..... \$ Call

Systems Plus
Landlord (para mgmt)..... \$ 375

Visicorp

VisiCalc..... \$ 165
VisiOn..... Call

Wang/Aspen

Grammatic..... \$ 60
Procedrader..... 42

Woolf

Software Systems
More PC to CFM
and PC to PC)..... \$ 89

... and many more.

GAMES

Automated Simulation
Armok, Avalon Hill,
Blue Chip, Brotherhood,
Data West, Infocom,
On Line, Spinnaker
Software, Sierra-On-Line,
Sublogic, Weekly
Reader..... \$ Call

SDL, Inc.

STOPLOCK
Completely STOPs com-
puter in boot mode —
LOCKS IT UP INTERNALLY
OPENS only to valid user
with I.D. code (Check
money-back guarantee by
SDL, Inc.)..... \$ Call

BOARDS

AST Research

Six Pak Plus 64K (Sec, Par, Ck, up to 384K) ... \$ 269
 MegaPlus 64K (C/Col, Ser, Port, 512K capacity w/Megapack) ... \$ 269
 Monograph Plus ... \$ 499
 CC-232 card ... \$ Coll
 Extra parts for MegaPlus and VIO Plus II
 Game, Par & Ser ... \$ 40
 Megapack 256K expansion ... \$ 325
 VIO Plus II (C/Col, Ser Port) ... \$ Coll

DISPLAY CARDS CORNER

Amdek MM Card ... \$ 420
 Frederick/Pertronics ColorPlus ... \$ Coll
 Hercules Graphics Board ... \$ 359
 Quadram Quadcolor I ... \$ 199
 Quadcolor II ... \$ 389
 Quadcolor III (upgrade) ... \$ 210
 Teconar Graphics Master ... \$ 499
 USI Display Card (c/machochrome) ... \$ 399

McInroy Electronics

Flappy Dr Controller ... \$ 169
 w/Par Port ... \$ 219
 w/Ser/Par Port ... \$ 229
 Sandstar Flappy Dr Controller ... \$ 199
 Sandstar Memory Card -3 modules cap (10K) ... \$ 145
 Sandstar Multifunction Card -5 modules cap ... \$ 79

Quadram

Quadboard 64K (Sec, Par, Ck, up to 384K, Ser & Par Ports, Software) ... \$ 279
 Quadboard 384 (OK) ... \$ 229
 Microfazer Shock Printer Buffer (exp. to 512K) ... \$ 139
 Ser/Par BK (exp. 64K only) ... \$ 149
 Ser/Ser BK (exp. 64K only) ... \$ 149
 Quadlink 64K Mem. Exp. Apple 512K to run on IBM/PC ... \$ 469
 All Others ... \$ Coll

PC NETWORKING

AST Research PC NET II Bus Syst. ... \$ 899
 The "Orchard Blossom" (to 284K, Ck w/ alarm, S&P ports, ram disk & disk caching, upgradeable to PCNet) ... \$ Coll
 Quadram Quadlink Link 2 w/ 255 IBM PC's ... \$ Coll
 Santa Clara Starter Kit ... \$ 1245
 X Comp X Net 12 bds ... \$ 829
 X Net Exp Bld. ... \$ 429
 Ad/I Networking Products ... \$ Coll

Rainbow Technologies

OK Writer ESA (for Okidata 83A, 82A) ... \$ 99

Teconar Products

Xedex/Microlog Baby Blue ... \$ 325
 Baby Blue II ... \$ 325

MONITORS

Amdek Video 300A Amber ... \$ 149
 Amdek Color II ... \$ 429
 NEC RJ201-12" Grn ... \$ Coll
 NEC RJ280-12" Grn ... \$ 119
 NEC IC2100 RGB ... \$ 429
 Panasonic ... \$ Coll

SONY Component TV System I

Profeel 19" Trinitron Color Monitor (Analog digital RGB inputs for graphics and teletext/ videotext applications built-in stereo amp w/ 5 watt per channel output) ... \$ Coll
 VTX-1000R Profel Access Tuner (Cable ready express tuning, pay-TV ready, stereo ready, 10 key express command, multiple video & stereo inputs/outputs) ... \$ Coll
 SS-X3A Component Speakers ... \$ Coll

PGS HD12 RGB Ck ... \$ 499
 MAX 12 ... \$ 220
 SR12 1690 x 480 ... \$ 639
 Doubler Card (for SR12) ... \$ 175
 Quadram Quadchrome ... \$ 495
 Sanyo SR12-1298 Gr ... \$ 199
 Teconar Sanyo SR12-UY 12" HR Am ... \$ 139
 KQ12N 12" HR Gr ... \$ 132
 RGB Vision 12" LR Ck ... \$ 320
 RGB Vision 3 12" LR Ck ... \$ 459
 USA 1200A 12" HR Am ... \$ 159

MODEMS

Hayes Smartmodem 300 ... \$ 225
 Smartmodem 1200 ... \$ 499
 Smartmodem 1200B (int.) ... \$ 439
 Microcom, Inc. Eva 2 1200 internal board ... \$ 395
 Quadram Quadmodem (Stand alone full 202A compatible w/ Quadlink software) ... \$ Coll
 Novation ... \$ Coll
 US Robotics Auto-Dial ... \$ 459
 Password ... \$ 325
 S 100 ... \$ 349

DISK DRIVES

CDC 1800 ... \$ 209
 Dervue HD ... \$ Coll
 Dawong 10/15/20MB HD ... \$ Coll
 Santa Clara HD ... \$ Coll

XEBEC

9710 10MB Hard Disk including host adapter (Personality 1) and soft ware to work on IBM/PC ... \$ 1599

A variety of complete PC compatible systems are available at Oryx. For assistance in determining your needs, use our technical line.* We will be happy to provide full support.

Columbia Hyperion

Corona Televideo

XTend TM-100-2 ... \$ 199
 Vata Dynafume System w/ 5 to 40 MB Primary Disk Drive ... \$ Coll
 HALF HIGHS Matsushita ... \$ 199
 Panasonic ... \$ 199
 Shugart ... \$ 225
 Tasci w/bracket ... \$ 280

PRINTERS

Diablo 630 ECS ... \$ Coll
 Diablo 630 API ... \$ Coll
 Epson ... \$ Coll
 Magnusson Tally MT 180 ... \$ 810
 MT 160L ... \$ 569
 Spirit ... \$ 315
 420L ... \$ Coll
 440L ... \$ 2299
 NEC CS550 ... \$ 1650
 Okidata 82-93 ... \$ Coll
 Quadram Quadplot ... \$ Coll
 Siemens Ink Jet Printers P188 ... \$ 749
 Star Micro ... \$ Coll
 Telexis T100A ... \$ 469
 Transor ... \$ Coll
 ... and much more.

AUGUST SPECIALS!

Juki Industries of America, Inc.

4300 - Prints graphics, 2K buffer, resp to 3K, buffer, tractor feed option, proportional spacing, 11" print line, uses IBM-char drop-in dotry wheel and IBM Selectric II ribbon ... \$ 449

Printek, Inc.

920 S/P - 340 cps multifunction, 80 cps letter quality, 360 lines per minute, 13x6 in, 1-4 copies w/ IBM & perfected standard, 144 x 144 dots/inch graphics, Bell & Howell third party service ... \$ 2,099

DISKETTES

3M 5" DS DD Box ... \$ 40
 CDC ... \$ 28
 Maxell 5" DS DD ... \$ 40
 M02 Box ... \$ 40
 Spectram 5 1/4" DS, DD (box/10) ... \$ 29
 Verbatim 5" DS DD Box ... \$ 35
 (3 Boxes Disks/10 Minimum)

PLOTTERS

Amdek DXY-100 ... \$ 599
 Amplor II ... \$ 899
 Enter P100 Sweet P ... \$ 545
 Star Shooter ... \$ Coll
 Houston Instruments ... \$ Coll
 Panasonic Digital Plotter VP600IP ... \$ 1,375

MISC.

Alpha-Delta "MACC" surge protector ... \$ 55
 Flip 'Y' File 51K ... \$ 22
 Hauppauge R387 Math Pkg w/ software ... \$ 255
 B7 Chip ... \$ 159
 Others ... \$ Coll
 Key Tronic 3150 ... \$ 175
 KR551 ... \$ 219
 KR551D ... \$ 219
 5151 (home as 5151 but with voice recognition) ... \$ Coll
 Microsoft Mouse ... \$ 155
 Mouse Systems PC Mouse ... \$ 229
 SGI Hornet II Olytech CRT Mon ... \$ Coll
 Street Electronics Echo Speech Synth for IBM ... \$ 179
 Systems Management Assoc. PC Document (computer reference add) ... \$ Coll
 TG Joystick ... \$ 49
 Thunderware Thunderlock ... \$ 126
 Versa Computing Versawriter ... \$ 239

Policy:

- Wisconsin residents add 5% for sales tax.
- Minimum \$4.00 for shipping, handling and insurance for orders to \$200.
- For orders over \$200, add 2 1/2% for shipping, handling and insurance.
- 1/2% discount for cash payments.
- Foreign - add 15% handling & shipping for prepayment. (Int'l money order).
- Prices are subject to change without notice.
- All items subject to availability.

ORYX SYSTEMS, INC.

CRAFTSMEN OF THE NEW TECHNOLOGY
 425 First Street • P.O. Box 1961
 Wausau, Wisconsin 54401

*For technical assistance, order status and in Wisconsin:
 715-848-1374

Int'l Telex: 260181
 ORYX SYS WAU

We Welcome:

- Visa, MasterCard and American Express. (No charge for credit cards.)
- Corporate, government and educational accounts. (For additional discounting, please ask for special accounts desk.)
- COD (Add \$2.00 per shipment. Cash or certified check required.)
- Checks. (Allow 1-2 weeks for clearing.)

Working Hours:

Monday-Friday 8:30-6:00
 Saturday 10:00-2:00
 Central Time

ORDER TOLL FREE OUTSIDE WISCONSIN 1-800-826-1589



COHERENT™ IS SUPERIOR TO UNIX* AND IT'S AVAILABLE TODAY ON THE IBM PC.

Mark Williams Company hasn't just taken a mini-computer operating system, like UNIX, and ported it to the PC. We wrote COHERENT ourselves. We were able to bring UNIX capability to the PC with the PC in mind, making it the most efficient personal computer work station available at an unbelievable price.

For the first time you get a multi-user, multitasking operating system on your IBM PC. Because COHERENT is UNIX-compatible, UNIX software will run on the PC under COHERENT.

The software system includes a C-compiler and over 100 utilities, all for \$500. Similar environments cost thousands more.

COHERENT on the IBM PC requires a hard disk and 256K memory. It's available on the IBM XT, and Tecmar, Davong and Corvus hard disks.

Available now. For additional information, call or write,

Mark Williams Company
1430 West Wrightwood, Chicago, Illinois 60614
312/472-6659



COHERENT is a trademark of Mark Williams Company.
*UNIX is a trademark of Bell Laboratories.

CIRCLE 391 ON READER SERVICE CARD

Softline

THE PROFESSIONAL'S CHOICE

WORD PROCESSING/ EDITORS

Easywriter II System	\$219
Edo/Worda	\$26.9
Final Word	\$189
Microsoft Word	\$279
Microsoft Word/Mouse	\$299
MultiMate	\$279
ProactTest 5000	\$219
Perfect Writer/Speller	\$249
PFS Write	\$ 95
Samme Word II	\$329
Select Word Processor	\$199
Spellfinder	\$249
SuperWriter	\$179
Volkswriter Deluxe	\$179
The Word Plus (Basic)	\$109
Word Perfect (DOS)	\$249
WordPlus-PC with The Boss	\$329
WordStar	\$279
WordStar Professional	\$359
WordStar Professional	\$359
WordStar Systems Pak	\$189

DATABASE SYSTEMS

Alpha Data Base	
Manager II	\$179
Comdex II	\$229
dBase II	\$369
dBasis	\$ 89
Index	\$179
InfoStar	\$269
KnowledgeManager	\$299
Perfect File	\$159
Personal Perfect	\$199
PFS File/PFS Report	\$159
Powerbase	\$289
QuickCode	\$169
R-base 4000	\$289
T/Maker III	\$199
TM IV	\$269
Versatium	\$249

SPREADSHEETS/ INTEGRATED PACKAGES

Framework	\$249
InteCalc	\$189
Jack 2	\$329
Lotus 1-2-3	\$119
Multiplan	\$135
Open Access	\$399
Orion	\$249
SuperCalc 3	\$259
Symphony	\$249
TBI Solver	\$259
VisiCalc IV	\$159

PROJECT MANAGEMENT

Harvard Project	
Manager	\$269
InterPlan/Pan	\$279
Solar Project Scheduler	\$279
VisiSchedule	\$199

GRAPHICS/STATISTICS

Abolot	\$279
BPS Business Graphics	\$279
Chairman Combo (I&V)	\$349
Chartmaster	\$279
Graph	\$189
Intergraphs	\$279
Fast Graphs	\$199
Graphmaster Combo	\$429
PC Draw	\$289
PFS Graph	\$ 95
Statpac	\$299

ACCOUNTING MODULES

Ask Micro Accounting	\$299
BPI Accounting	\$369
IUS EasyBusiness System	\$319
MBA Accounting	\$369
Open Systems Accounting	\$419
Packpak 4 (GL/AP/AR)	\$279
Paychex Accounting	\$399
Real World Accounting	\$469
Site Accounting Partner	\$269

PROFESSIONAL DEVELOPMENT

Management Edge	\$139
Think Link	\$179

HOME/PERSONAL FINANCE

Bollers and Sense	\$119
Financier II	\$119
Home Accountant Plus	\$ 99
Pro Finance 84	\$189

LANGUAGES/UTILITIES

Access Manager	\$239
Digital Research	
C Compiler	\$219
Display Manager	\$299
Microsoft C Compiler	\$229
MS Basic Compiler	\$249
MS Fortran	\$279
Pascal MT-86	\$249
Norton Utilities	\$ 55

COMMUNICATIONS/ PRODUCTIVITY TOOLS

Crosslink	\$119
Memory Shift	\$ 79
Move II	\$109
Prokey 3D	\$ 95
Swancom II	\$109

HARDWARE PERIPHERALS*

AST Six Pak Plus (S4K)	\$769
Deadboard (DB)	\$209
Hayes 1200B with	
Smartcom	\$399
Hayes Smartmodem 1200	\$499
Harco Graphics Board	\$349
Epson FX 100 Printer	\$ 49
Comex II Printer	\$249
C-High Powerlaser	\$179
C-High Stereo	\$179
Diskette 93A	\$149
64K Memory	\$ 55

*Call for shipping.

Lotus
1-2-3
\$319

WordStar
Professional
\$359

dBase III
\$CALL

R: base
4000
\$289

Multi Mate
\$279

SuperCalc 3
\$239

Word &
Mouse
\$299

Microsoft C
Compiler
\$329

PFS: File
PFS: Report
\$169

Smartmodem
1200B
\$399

AST
Six Pak Plus
\$269

Smartmodem
1200
\$499

Corporate Accounts—Join the roster of over 100 major corporations who have sampled our excellent pricing, reliable service and friendly support. Call for details.

DISCOUNT COUPONS

With each order, we offer discount coupons worth up to \$10 on your next order.

FREE!

Diskette Library Case

... with your order. This attractive case protects, indexes and stores 10 diskettes for quick retrieval. Normally a \$10 value, it is now available **FREE** to Softline customers



TERMS

Checks—allow 14 days to clear. Credit processing—add 3%. COD orders—cash, M.O. or certified check—add \$3.00. Shipping and handling UPS surface—add \$3.00 per item (UPS Blue \$6.00 per item). NY State Residents—add applicable sales tax. All prices subject to change.



Softline

Softline Corporation
3060 Bedford Ave., Brooklyn, NY 11210
TELEK 421047 ATN LU

Will your plug-in modem plug you in?

Pick out any plug-in modem card. Look it over. Study it. Is it truly compatible with your computer? Does it offer the features you want? Is it a good value?

Maybe not. Unless you pick the AJ Connection from Anderson Jacobson.

The AJ Connection—complete with all four comports—provides more communications capability than any other plug-in modem in its class. And it works on any IBM bus-compatible computer: IBM® PC. IBM XT. Compaq®. Columbia®. TeleVideo®. Fujitsu®. Eagle®. And more.

Your connection to the outside world.

An AJ Connection system will link your computer to data banks, mainframes, remote terminals, or other PCs. It dials up to 40-digit sequences, answers calls, and disconnects. All automatically. All from one board.

The asynchronous communications adapter that many systems don't include

is standard. So you get an extra port for simultaneous recording and printing. Plus a built-in speaker. All without overlapping into adjacent expansion slots.



AJ Connection comes complete with plug-in modem, cabling, software, and full documentation.

Powerful software.

Crosstalk® XVI auto-dial software lets you program up to 40 function keys for quick log-on to remote systems. It displays transmittal times, disk space, and other necessary data. Lets your system password-protect your data. It even allows terminal emulation.

Best of all, Crosstalk is easy to use. You simply follow the menus and prompts.

Since the AJ Connection is compatible with all major communications software, you can buy just the hardware if you prefer. Either way, you get more modem for less money.

Ask your computer dealer to plug you into the AJ Connection. The latest in a long line of reliable communications solutions from AJ.

Or call us direct. Anderson Jacobson, Inc., 521 Charcot Avenue, San Jose, California 95131. Regional offices: Chicago, IL (312) 671-7155; Fair Lawn, NJ (201) 794-9316; San Jose, CA (408) 263-8520. Dealer inquiries welcome.

*Trademark

AJ ANDERSON
JACOBSON

CIRCLE 126 ON READER SERVICE CARD



We're Clean

If you're one of the many computer users who are struggling to go straight on software ownership take it from someone who's already there—you're traveling in good company.

We're clean. I've wanted to open this column with these words for some time now. On the one hand, it was easy. On the other, it'll take diligence and effort to stay clean.

We finally own all of the software that we use for our daily work: the word processors, the database managers, the occasional spreadsheet. I'm less proud of the fact that we're clean than displeased with the fact that we weren't. But we've been growing steadily, adding people and machines. As we added machines, illicit copies crept onto many of them.

Given PC's position and working relationship with software publishers, I'm less concerned about prosecution than persecution. We really don't need the enmity of these people, and we owe them the respect that their labors are due.

It's altogether too easy to overlook the software side when you order up a new computer, figuring that you'll make copies just to get the person started and add legitimate software later. The average user, as I've pointed out before, absorbs software the way a potato chip absorbs moisture on a muggy day. He does it with hardly more malfeasance than the potato chip; the stuff just seems to appear out of nowhere. Controlling it is a major task.

The cynics among you will say,

"Well, listen to goody two-shoes. There he sits, up to his neck in PCs and software, and he's preaching about how we should stamp out copying in our firms."

Yes, we are up to our neck in PCs.



Bill Machrone

And compatibles. And software. I can walk over to the Toy Shop (our test lab) and pick up just about any word processing program that you could name, but frankly, this doesn't mean much.

Can you imagine the chaos if we all used different word processing packages? Or worse, different database managers? So we standardize, and we buy the additional copies we need to get the job done.

Like that potato chip, we never intended to accumulate illicit copies of soft-

ware. Instead, our behavior was a faint echo of Sir Edmund Burke's immortal words: "In order for evil to succeed, it is necessary only for good men to do nothing." I'm pleased to report that we are now doing something and that our management accepts the idea (indeed, it never thought otherwise) that acquiring sufficient software is part of the cost of doing business.

Everyone at PC shares these sentiments. And to make sure that we're all pulling in the same direction, I issued the following memo:

To: PC Editorial Staff
From: Bill Machrone
Subject: Software Copies

As you probably know, Ziff-Davis is an active supporter of the Software Protection Fund, an association of software publishers and manufacturers. Its charter is to educate the public about software piracy and copyright infringement.

We at PC must do our part in reducing the incidence of these activities by policing our own actions:

1. If someone asks you for a copy of a program or documentation, tell him no. Whether it's for business or personal use, the answer is still the same.
2. If you're using software on your machine for which we do not have an

Incredible!

A software program that performs 7 desk management functions even while you run other software.

The critics are raving:

“It's a gem....There's really nothing quite like this package anywhere else....
THE DESK ORGANIZER is a class act.”

—PC (Magazine)

“THE DESK ORGANIZER is so easy to use that its manual might be considered overkill.”

“THE DESK ORGANIZER is a superb software package.”

—Infoworld

“Extraordinarily impressive....Just about the most useful thing for the manager since 1-2-3, or maybe it's better, since you can run 1-2-3 from THE DESK ORGANIZER.”

—Microcomputing

“It does just about everything except play 'For He's a Jolly Good Fellow' at the end of a rough day.”

—Inc.



WARNER SOFTWARE PRESENTS:

THE Desk Organizer™

for the IBM PC

At last, a software program to completely organize your business day AND run side by side with virtually any other IBM software you now use.

The secret is META—which enables you to use THE DESK ORGANIZER alone or have it lie dormant in your computer's memory while you run Wordstar, Multiplan, Lotus 1-2-3, VisiCalc... BUT the moment you need it to file an idea, write a letter or memo, record an appointment, check your schedule, do a quick calculation or make a phone call, you simply wake it up with a keystroke, complete your task and with another keystroke, return to the other program you were working on.

THE DESK ORGANIZER is designed to take care of all your important daily business tasks.

IT FILES

Notes to yourself, messages, to-do lists, estimates, appointments, agendas, correspondence, mathematical formulas, telephone lists. Touch "F" for file and enter anything you want to remember. Without worrying about formatting, or predesigned data fields. Like a rolling card file, THE DESK ORGANIZER files free form.

IT ORGANIZES

It alphabetizes. It can create as many indexes as you need. It can file under multiple labels, cross-reference entries, scroll through the files and recall data instantly. It can retrieve things like telephone numbers even if all you can remember is the first name of the person concerned.

IT DIALS

It can take care of all your routine telephone chores. Find numbers in reports or correspondence. Dial, redial (just touch "P" for phone). It can get an outside line, call an 800 number, insert a long-distance access code automatically, enable you to bank by phone.



IT WRITES AND PRINTS

Press "T" for type and write a letter, record the content of an important telephone call, or send a colleague a sudden thought. And if your need is for a standard business letter, THE DESK ORGANIZER can help you there too. Included in its memory are 25 of the most commonly needed business letters to adapt to fit your needs. Then touch a key and THE DESK ORGANIZER will print the letter for you in the type style of your choice.

IT CALCULATES

One keystroke and THE DESK ORGANIZER brings a visual calculator to the screen. Alongside it is an electronic paper tape which records your calculations as you go. Also accessible is a more sophisticated formula calculator which can run any formula you create with up to 26 variables, store them, edit them. Or you can make use of 25 commonly used business formulas THE DESK ORGANIZER provides.

IT CHIMES TO REMIND YOU

Even while you're working on other software, THE DESK ORGANIZER can sound a chime to remind you it's time for a meeting, a lunch date, to catch a plane. Press a key, and relevant notes appear on the screen. Call up your visual appointment calendar and check or print out today's things due and things to do.

THE DESK ORGANIZER GIVES YOU ONE-TOUCH CONTROL OF YOUR BUSINESS DAY

See for yourself. Mail the card to receive a demonstration disk for just \$2.00. If the card is missing, send your check or money order to THE DESK ORGANIZER, Warner Software Inc., Dept. Z, 666 Fifth Avenue, New York, NY 10103.

FREE WHEN YOU BUY THE DESK ORGANIZER

Quarterly newsletter on new uses, features, peripherals.

Updates, significant enhancements or modifications sent to you on disk.

On-disk tutorial and step-by-step manual make learning easy.

Formulas, letters, calculations. 25 preset formulas to calculate such things as return on investment, present value and depreciation. 25 business form letters you can adapt for your own purposes.

IBM PC is a trademark of International Business Machines Corporation.
Lotus 1-2-3 is a trademark of Lotus Development Corporation.
Multiplan is a trademark of Microsoft Corporation.
THE DESK ORGANIZER and META are trademarks of Conceptual Instruments Company.
VisiCalc is a trademark of VisiCorp.
Wordstar is a trademark of Micropro International Corporation.

Requirements: For the IBM PC or XT • Needs 128K memory

A business software breakthrough from Warner Software Inc.

CIRCLE 415 ON READER SERVICE CARD



\$295
suggested
retail price

EDITOR'S SCREEN

original program disk or other clear title, please let me know. We will buy you what you need.

3. Don't allow evaluation copies of soft-

ware to accumulate on or about your machine. When you know that you have no further use for a particular program, return it to the Toy Shop li-

brary and erase any copies.

4. Be serious. What software products do you really need and use? If there's something you want but don't have, don't wait for it to appear one day so you can snare a copy. Ask for it.
5. Remember that our good relationships with the manufacturers are based on mutual trust and professionalism. If we violate this trust, we will lose their cooperation and good will.
6. Don't waste your time and effort trying to defeat copy protection schemes. If you need a copy that badly, we'll buy it. If the scheme is so obnoxious as to interfere with the convenient use of the product, notify the manufacturer.

One of the nice things you'll discover if you need to buy many copies of a package is how cooperative the manufacturers can be. Many manufacturers offer quantity discounts, some of them substantial. The manufacturers know the value of your business, and they'll even compete for it. Acquiring the software you need may cost you less than you might think.

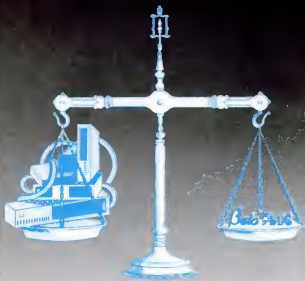
There is also a double reward in having legitimate copies for all employees. One of them is almost obvious, and the second is subtler:

First, your employees will be more productive if they have their own set of documentation. They may begin using features of the software that they didn't know were there. They'll also have the right to use technical support phone numbers and receive upgrades that apply to the product in question.

Second, they'll feel that the company really cares about them. There is a definite but intangible benefit in knowing that the company cares enough about what you do to invest time and money in equipping you for your job.

Getting clean: When you get right down to it, it's really kind of simple. And it's not too late, for my organization or yours. ■

WEIGH THE ALTERNATIVE



WATCH FOR IT...

at your local computer store.



Beta PLUS
cartridge disk systems

The "add-on" drive you'll never add on to...

RP Marketing Corp. Arvada, CO 80002 (303) 424-1546

Distributor - Direct Specials

DISKETTES

RP's 100% certified/10 year warranty
DS/DD } Flip Box of 10 { \$29.95
SS/DD } { \$24.95

IBM COMPATIBLE PC

Tava PC w/256 k, 2 drives including
INTEGRATED SOFTWARE
valued at \$700.00... Total package
only: \$2,495.00 F.O.B./Denver

IBM is a trademark of the International Business Machines Corporation

MC/VISA cards add 2%

CIRCLE 396 ON READER SERVICE CARD

**This
"Finger
Friendly"
keyboard**

will make you more productive everytime you turn on your IBM PC.

Finger Friendly

Do you love your PC, but hate its keyboard? Would you like to have a quiet keyboard, with keys in the standard typewriter position? Now there is a low cost alternative to the IBM keyboard. Look at the improvements:

- ☐ **A Wider, Left Hand Shift Key/in the Standard Typewriter Position.**

- ☐ **Full Width Return Key.**

- ☐ **Lighted Indicators on CAPS LOCK and NUM LOCK Keys.**

- ☐ **A Long ENTER Key Next to Ten Key Pad for Adding Machine-Like Entry.**

- ☐ **Long Life, Capacitive Key Switches with Microprocessor Control.**

- ☐ **No Irritating Clicking Sound.**

- ☐ **Finger Homing Bumps on F, J, and 5 Key of Numeric Pad.**
- ☐ **Two Stage Key Resistance Gives Tactile Feedback Through Your Fingers, not Your Ears.**

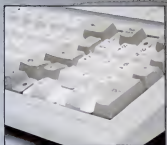
And those are just the improvements! You don't have to give up the color matched, low profile case. Or three position height adjustment. It's the enhancement that will make you more productive everytime you turn on your PC.

About Us

Although we sell our products direct to you, don't confuse us with mail order companies. You see, we only sell a few selected products, which we stock in depth, and service right here in our own facilities. So you get the mail order sized price, and support based on extensive experience with our products. When you call us you get informed answers.

Whether it's a Qubie' modem, standby power system, multi-function board, or keyboard—we are ready to help you before and after the sale. And if you would rather buy from a local

DEALER INQUIRIES INVITED



dealer, no problem. Many dealers now stock Qubie' products, with more adding them each day.

All our products come with our 30 day satisfaction guarantee. If you are not completely satisfied you may return the keyboard for a refund, including the postage to send it back. In fact, we suggest you get a competitor to make the same offer, buy both products, and return the one you don't like. We know which one you'll keep.

IBM is a trademark of International Business Machines Corporation



**AVAILABLE
FOR PC JR.**

Qubie' Finger Friendly Keyboard,
with 1 year warranty.
Part No. FF5150 **\$169.**

Order Today, Shipped Tomorrow!

Price includes UPS surface freight and insurance. Add \$7.50 for two day air service. For fastest delivery send certified check or credit card. Personal checks take 18 days to clear. Calif. residents add 6% sales tax. Corporations and Institutions call for purchase order details.

(800) 821-4479

Toll Free Outside California

(805) 987-9741

Inside California

QUBIE'

4809 Calle Alto
Camarillo, Ca. 93010

Tempo House, 15 Falcon Road,
London SW11 2PH, United Kingdom

© Copyright Qubie' 1984

CIRCLE 363 ON READER SERVICE CARD

WHAT'S YOUR BEEF?

Do you have to spend too much time getting through all kinds of peripheral matters before you can get into your applications? Do you have to spend too much time on training and retraining of personnel? We plan to eliminate or at least mitigate those and some of your other "BEEFS".

We're here to tell you about SYSTEMATE: WHEN YOU GET SYSTEMATE, you will have fewer "BEEFS" because you can get RIGHT into YOUR APPLICATIONS without having to spend so much time figuring out how to make the computer do what you want it to do? And you won't have to remember what to do the next time, because SysteMate does that for you.

We call it SysteMate, because that is what it does—it mates your software and hardware together into an INTEGRATED SYSTEM. The system virtually eliminates the need to know and understand PC-DOS. It will help ORGANIZE your systems and procedures. It is amazingly easy to install and operate. There are extensive context and training support HELP facilities. It provides extensive user definable MENU INSTALLATION functions. It has an unlimited MULTIPLE MENU capability, which means that there is NO LIMIT to the number or type of software you can interface with SysteMate. All PC-DOS software programs, utilities and commands are ONLY A KEY STROKE AWAY!

SysteMate enables Lotus and WordStar, and/or any other combination of applications, to ACCESS COMMON DATA FILES.

IF YOU WANT TO:

- Get right into your applications without having to spend a lot of time getting through all kinds of peripheral start-up procedures
- Eliminate unnecessary time spent on training and retraining your staff about subjects that have nothing to do with your applications
- Organize your computer activities in a systematic way
- Use the computer to increase productivity and profits

SYSTEMATE IS YOUR ANSWER!



SysteMate features: UNLIMITED NUMBER OF NESTED MENUS, DISKETTE LABELING, LABEL CHECKING PRIOR TO MOUNTING, PRE/POST EXECUTION INSTRUCTIONS, PASSWORDS, AUTHORIZATION CODES, ACCESS CODES, UNIQUE PROGRAM SUBSYSTEM SECURITY LOCKS, AND ONE KEY STROKE ACCESS.

• SYSTEMATE IS AVAILABLE FOR ANY PC-DOS SYSTEM COLOR OR MONOCHROME.

• SYSTEMATE IS IDEAL FOR ANY HARD DISK USER.

• AND IF YOU ARE A DISKETTE USER, AND THINK SYSTEMATE IS PRIMARILY FOR HARD DISK USERS, WAIT UNTIL YOU SEE WHAT IT CAN DO FOR YOU!

SysteMate is now being used by hundreds of major corporations and thousands of individual users!



47⁰⁰
Suggested Retail Price

SysteMate, Inc.

TWIN TOWERS EAST
MARKETING SUITE 200
1106 CLAYTON LANE
AUSTIN, TEXAS 78723-1033
(512) 458-6202

ORDER TOLL FREE "24 HOURS/DAY"

1-800-824-7888-OPERATOR 806
In Alaska/Hawaii 1-800-824-7919
(MC, VISA, OR C.O.D.)

DEALER/DISTRIBUTOR INQUIRIES
WELCOME

SysteMate™ is a trademark of SysteMate, Incorporated

LOTUS® and Symphony™ are trademarks of Lotus Development Corp.
WordStar® is a trademark of MicroPro International Corp.

dBASE® and Framework™ are trademarks of Ashton-Tate.
Multiplan™ is a trademark of Microsoft.

CIRCLE 461 ON READER SERVICE CARD

Copyright © 1985 SysteMate, Inc.

Caveat Emptor

Frantic competition in the market for PC products has created pitfalls for the unwary buyer. Here are tactics for navigating the murky waters of the marketplace.

Before IBM introduced its PC, choosing a microcomputer was pretty easy. The range of choices for the would-be buyer was narrow—only a few manufacturers existed, most of them very small. Applications were primitive and main memory capacity was limited.

IBM changed all that. Within a year of its appearance in late 1981, sales of the PC led to a growth in the microcomputer industry that exceeded everyone's expectations, including IBM's.

This growth has created a certain chaos in the industry. In a frenzy of competition, many new products were rushed to market half-baked. What used to be a narrow range of choices exploded into a bewildering array of products and new technologies that are difficult, if not impossible, to compare. Pity the poor buyers and users.

The width of this vast market attracted both users and sellers who were naive, first-time participants in the computer industry. Today, anyone—user or vendor—with more than 3 years of experience qualifies as an "expert." Many of these people are now expected to make competent, informed decisions that, ironically, they have neither the tools nor the experience to make.

How can the first-time PC user avoid the "experts" and pick winners? One

way is to look for standards; de facto standards are best. Another way is to buy from IBM or from some manufacturer with whom you've previously had good experience. Many users do so, especially



David M. Allen

corporate customers who are sensitive to long-term support issues. But this strategy can mean missing out on good products not yet available from the "safe" manufacturers—a case of throwing out the baby with the bath water.

Another tactic is to watch major manufacturers and see what direction they're moving in. An example here is the microfloppy. You must choose from three available sizes—3 inch, 3½ inch, and 3¾ inch—and the proponents of each claim that theirs will become the "standard."

But Hewlett-Packard and Apple are already using Sony's 3¼-inch product. The other two contenders have never been used by a major manufacturer in a successful product.

Dealers Choice?

One of the worst approaches is to let your dealer make choices for you. Although many dealers are savvy in avoiding technological pitfalls, most are not and it becomes a case of the blind leading the blind. With many sales occurring through discount and mail-order channels, dealers end up handling whatever sells best, whatever gets the best markup, or whatever has been overstocked. In other words, the dealer may not be working in the customer's best interest.

These tactics can prevent a pitfall or two, but consumers won't feel secure when navigating through the market place until they themselves become more sophisticated regarding the computer industry. As long as customers rely on dealers or manufacturers to tell them what to buy, they will be taken advantage of. If customers are informed and can learn lessons from the industry's history, their decision-making will dramatically improve. ■

David M. Allen is president of Tallgrass Technologies Corporation.

ORDER DESK ONLY
(800) 292-3360
TOLL FREE IN CALIFORNIA

"WHY PAY MORE"
COMPARE THESE PRICES

MC-P APPLICATIONS

Brings Software & Hardware
At Unbeatable Prices

ORDER DESK ONLY
(800) 292-3360
TOLL FREE OUTSIDE CALIF.

SOFTWARE

	LIST	OUR
ASHTON TATE		
dBase II	\$700	\$295
Financial Planner	700	452
Friday	295	175
CONTINENTAL		
Home Accountant	150	105
FOX & GELLER Quick Code	295	174
FUNK SOFTWARE Sideways	60	45
HOWARDSON		
Real Estate Analyzer II	250	165
HUMAN SOFT DB Plus		89
LIFEBOAT SYSTEMS		
Lattice 'C' Compiler	500	325
LIFETREE Volkswriter Deluxe		175
LIVING VIDEOTEXT		
Think Tank	195	125
LOTUS - 1-2-3	495	299
MICROPRO Spell Star	250	162
Mail Merge	250	162
Super Sort	250	149
Calc Star	145	86
Info Star	495	320
Word Star Pro w/Correctstar	695	369
MICRORIM R Base 4000	495	325
MICROSTUFF Crosstalk	195	109
MICROSOFT		
Multiplan	250	159
Flight Simulator	50	35
Multitool Word W/Mouse	475	295
Pascal Compiler	350	245
C Compiler	500	325
PETER NORTON		
Peter Norton Utility	80	55
PBL CORPORATION		
Personal Investor	145	98
PEACHTREE Peach Pack	595	249
ROSESOFT Prokey		95
SATELLITE Word Perfect	495	325
SOFTWARE DIMENSIONS		
Accounting Plus		
GL, AR, AP, PR, INV—Each	599	399
SOFTWARE PRODUCT INTERNATIONAL		
Open Access	595	369
SOFTWARE PUBLISHING		
Pfs:File	140	89
Pfs:Report	125	79
SOFTWARE SYSTEMS		
Multimate	495	275
SORCIM SuperCalc II	295	175
SuperCalc III	395	239
Super Writer	295	205
STATE OF THE ART (FM Series)		
GL, AP, AR, INV, PR—Ea.	595	375
VISICORP Visicalc IV	250	175
Visifile	300	195
VisiTrend/Plot	300	195
VisiSchedule	300	195

Monthly Specials

Tandon TM 100-2
\$205⁰⁰
AST SIX PAK (64K)
\$265⁰⁰
AMDEK 310A
\$169⁰⁰
MULTIMATE
\$275⁰⁰
IRMA 3270
\$1045⁰⁰
OPEN ACCESS
\$369⁰⁰

Value Paks

LOTUS 1-2-3
\$299⁰⁰

**PLANTRONIC +
PRINCETON GRAPHIC**
\$869⁰⁰

**R:BASE 4000 +
MULTITOOL WORD
W/MOUSE**
\$585⁰⁰

**LOTUS 1-2-3 +
HERCULES CARD**
\$669⁰⁰

**ORDER STATUS &
TECHNICAL
SUPPORT — CALL
(408) 293-3360**

**Call for Hardware &
Software Prices Not
Listed This Ad**

**Used PC's & Apples
Bought & Sold**

CIRCLE 290 ON READER SERVICE CARD

HARDWARE

	LIST	OUR
HAYES MICROCOMPUTER PRODUCTS		
Stack Smart Mod 300	\$289	\$199
Smart Mod 1200 B (IBM)	599	429
Smart Mod 1200	699	495
MOUSE SYSTEMS		
P.C. Mouse w/Software	295	219
NOVATION		
J-Cat	149	105
Smart-Cat 103/212	595	445
Smart-Cat 103	249	187
KRAFT & TG-JOYSTICKS	70	35
ELECTRONIC PROTECTION DEVICES		
Orange	140	94
Peach	98	64
IBM PC 64K/2 Drives/ Controller Cd.		2169
IBM XT		4295
AST RESEARCH		
Megaplus 64K	395	265
Six Pac Plus 64K	395	265
QUADRAM		
Quadboard II 64K	395	275
Quadcolor I	295	219
Quad 512 + 64K	325	245
Quadlink	680	525
STB COLOR GRAPHIX CARD		375
TANDON		
TM 100-2 Drive	395	205
TALL GRASS		
Hard Disc & Tape, 12 Mgb	3495	2995
TEAC HALF HEIGHT		199
PEGASUS		
Hard Disk 10 Mgb (Internal)		1195
PRINTERS		
Epson FX 100		725
IBM Parallel Printer Cable	50	37
NEC 7730 RQ Parallel	2595	2295
Okidata 92	699	459
Qume 1140 plus	1685	1525
MONITORS		
Amdek MAI Board	599	459
Amdek 12" 310A	230	169
Amdek Color II RGB Hi-Res	529	399
Hercules Graphics Card	499	359
Princeton RGB Hi-Res	795	485
Plantronics Color Card	595	385
USI PI3	249	149

*International
Dealer Inquiries
Welcomed*

MC-P APPLICATIONS, Inc.

1630 Oakland Road, Suite A-114
San Jose, CA 95131, USA Phone (408) 293-3360
Telex: 821398 MCPA UD
HOURS: 8:30 a.m. to 5:30 p.m. — Mon. - Sat.
Call for Prices in Australia at 02-929-8468

TERMS: All prices subject to change. Cashier's check/MO/
Bank Transfer. Allow time for company or personal checks to
clear. Prices reflect cash prepaid discount. VISA/MASTER
CARD/COD/PO's 3%. California residents add sales tax.
SHIPPING: \$4 per item for UPS surface (\$8 for Blue Label);
Monitors \$20, Printers \$25, within continental USA.

Letters to PC

Added Notes for 1-2-3

Editor's Note: In response to our April 17 issue (PC, Volume 3 Number 7), we received the following letter from Lotus Development Corporation. It expands upon and clarifies a number of the points made in the ten articles we devoted to 1-2-3 and its many competitors.

We were pleased with your treatment of Lotus as the industry standard for integrated software in the various articles in the April 17 issue of PC Magazine. We would like to clarify some minor technical points made in the articles for the benefit of present and future users of 1-2-3.

Throughout the series of articles, you use the phrase "color graphics monitor" as a shorthand description of the necessary hardware for displaying graphics. This might be confusing to new readers. 1-2-3 can display graphics on both a color graphics and a monochrome monitor. What 1-2-3 requires is a color graphics board to produce graphs on graphics monitors and a Hercules graphics board to produce graphs on the IBM PC Display (often called the monochrome or text monitor).

On page 125 ("1-2-3 Links Arms with Business"), Stephanie Stallings reports that the user must strike the F8 key to produce a table. This applies only when you want to recompute the table after it has been created, presumably because you've changed a value or formula. When the table is first created, 1-2-3 calculates its values automatically.

Also, the statement that 1-2-3 requires 30 minutes to calculate values for a data table is misleading. For very large tables the calculations might take 30 minutes, but for many applications the calculations run in less than a minute. We ran a 96-row by 5-column table that involved square

roots, squares, sines, multiplication, and addition, and we waited only 13 seconds for the results.

On page 126 of the same article, Stallings explains a method for entering each consecutive month across a row of your worksheet. Alternatively, you might use



the Data Fill command, indicating @DATE(84,1,1) as the start value, 31 as the step value, and a very high number (perhaps 1,000,000) as the stop value. Neither approach will generate month labels unless you have range-formatted your target range with the Date option.

On page 127, Stallings says that keyboard macros are used to sort a 1-2-3 database. Commands that sort databases may be used in macros, but, as with all 1-2-3 commands (except the /X commands), database sorting commands are designed to be used interactively.

Also on page 127, the macro shown as an example needs to be written as follows:

```
{?}
{DOWN}
/XGA"
```

Without the tilde (~), 1-2-3 will misinterpret the /XG command of the macro.

We appreciate the ideas presented in "A 1-2-3 Wish List" (page 127). Here are some thoughts that might be of interest:

Using its Header and Footer options and a short macro involving the Range

Justify command, 1-2-3 can imitate some aspects of a word processor (albeit a very rudimentary one). The macro looks like this:

```
\E {edit}{?}
/rj{right}
{end}{down}
/xg\E"
```

If you set column B of the worksheet to a width of 51 and place the cell pointer in column A (its width should remain nine), invoking the macro will put you into Edit mode until you hit the Return key. Then what you have typed will be fit into a 60-space column of the worksheet. You can skip lines by using the cursor keys, and if you end up at the bottom of the worksheet by accident, you can recover by typing <up><end><up><edit>.

"Handing Off Your 1-2-3 Files," on page 130 implies that when the Formulas option of the File Extract command is used, only the formulas are written to disk. In fact, the current values of the formulas are also saved.

We recommend that in the "1-2-3 and VisiWord" section on page 130, under the subhead "Creating .PRN file from 1-2-3," the following step should be added:

5a. Using the Options option, select Other Unformatted, then quit.

On page 131, George Hughes says that the user will generally wish to transfer data from 1-2-3 to a database program to be sorted. For many sorting jobs, 1-2-3's Data Sort command will work.

On page 141, in "Armed for Learning 1-2-3," William Howard makes the important point that buying software locally can be safer than buying by mail order. Lotus maintains a policy of distributing only to dealers who sell face-to-face with the buyer for just that reason.

In the article, "Thumbing Through the

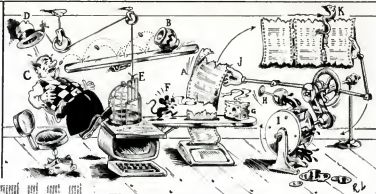
SIMPLIFIED SPREADSHEET ASSEMBLY

RISING SPREADSHEET (A) KNOCKS MEXICAN JUMPING BEANS (B) INTO MOUTH OF NEUROTIC MAN (C) WHO IS SO DISCOMBOLATED THAT HIS HAIR STANDS ON END DISLORDING HAIR (D) WHICH OPENS CAGE (E) AND RELEASES EPICUREAN MOUSE (F).

MOUSE, INSPIRED BY SCENT OF PERFECTLY ASHED CAMPESINATO CHEESE, GRABS THROUGH SPREADSHEET, ONLY TO DISCOVER HE HAD BEEN FOOLED BY AROMA OF OVER-RIPED GORGONZOLA (G).

IN A FIT OF PIGUE HE SPILLS VINTAGE WINE (H) INTO WATER-WHEEL (I) WHICH TURNS PULLEY THAT CAUSES GLOVE (J) TO GRASP SPREADSHEET AND MOVE IT TO TAPING AREA (K).

SHEET IS TAPED SECURELY IN PLACE BY TRAINED ADHESIVE TAPE WORM (K).



MADE SIMPLE.

Now you can save time, aggravation, adhesive tape, and Gorgonzola cheese by following one simple direction—Sideways. It's the unique software program that lets you output all the spreadsheet columns you need, all on one continuous page, all with one print command—and all for only \$60!

With Sideways on your side, no spreadsheet you invent with Lotus 1-2-3™, VisiCalc®, Multiplan™ or SuperCalc™ is too wide! And it's just as powerful an ally when you're creating far-into-the-future schedules and PERT charts with your word processor. In fact, for any wide text file, for dozens of uses, the way to go is Sideways.

The experts agree. PC Magazine, for example, writes: "If you've got the need, Sideways has the solution." And PC World calls Sideways "nifty . . . an easy to use program that does what it claims."

You can go Sideways today with an IBM® PC and an IBM® Epson, Okidata, Prism™ or Pro-writer™ printer. Ask for Sideways at your local ComputerLand® or other leading computer stores. Or mail a \$60 check to Funk Software, P.O. Box 1290, Cambridge, MA 02238. (617) 497-6339. MC/Visa accepted. Send no Mexican jumping beans, please.

SIDEWAYS™
FOR EASY-READING HARD COPY

CIRCLE 306 ON READER SERVICE CARD



Spreadsheets," the statement on page 145 that macros are worksheet-specific is accurate. However, it is easy to copy macros from worksheet to worksheet, using File-Combine. Once combined, the macros will not work until their range names are assigned. We recommend a format that both simplifies transferring macros and makes them easier to read. Type the macro names and the names of any cells within the macro in the column to the left of the macro, next to the corresponding named cells. Then assign all the range names at once using Range Name Labels Right. After the macro is combined into another worksheet, the same command sequence can be used to reassign its range names without referring back to the original worksheet.

The section about "Putting Spreadsheets Side by Side" beginning on page 146 says that 1-2-3 has no visual indication of protection ("Thumbing Through the Spreadsheets"). 1-2-3 displays unprotected cells at double intensity. It is true that there is no indicator of whether or not protection has been enabled.

The chart on the same page says that 1-2-3 is unable to display formulas in its worksheet. However, the Worksheet Global Format Text option causes all formulas to be displayed, while the Range Format Text option allows the user to choose which cells he or she wants displayed as formulas.

In "Touching Base with Database Managers" on page 152, the E (extract) and U (unique) commands are described first as copying, then as moving. In fact, they both copy records from a database to a target range. The U command is intended to be used with selected fields to determine what field values are represented in the data. For instance, from a listing of all the branches of a New England-based bank, one might like to determine what counties have branches. U (unique) copies each county name only once, no matter how often the name occurs in the database.

In the same article Glenn Hart says that

for lack of a programming language, 1-2-3 is not a relational database manager. One of the features that make 1-2-3 so powerful is its keyboard macro facility. That, coupled with its ability to refer to cells and ranges of cells by names instead of by cell addresses, allows a sophisticated user to imitate most relational capabilities, albeit only within a single worksheet.

In "SuperCalc² Grows on You," on page 175, mention is made that 1-2-3's macros facility is not capable of working across files. But in fact, using the Range Erase and File Combine commands, a 1-2-3 macro can combine a file, print it, range erase it, combine a second file, and so on.

We appreciate the extensive coverage of 1-2-3 in the April 17 issue. The information we have included in this letter should be helpful in keeping your readers even better informed about 1-2-3.

Daniel Gasteiger
Technical Communications
Lotus Development Corporation
Cambridge, Massachusetts

One Mac for Sale

Having owned many microcomputers (four brands and more than ten machines) since 1979 and having worked with five operating systems, I consider myself a qualified computer user. The Macintosh is

FOR SALE:
Macintosh
computer
(make offer)

a toy. Granted, it is full of tricks, but tricks are for kids. Here's a problem sampler:

1. There are bugs in DOS. The disk label "goes away" at times, and it is necessary to rewrite it. The machine can become so confused that a complete shutdown and reboot are necessary. Apple customer service tells me that they have no plans for an upgraded DOS.

2. *MacWrite* is a problem. If you turn the alarm clock on, click to justify both margins, and click the alarm clock again, the computer totally locks up, necessitating a reboot. The program is very frustrating after using such legitimate word pro-

The Macintosh is
a toy. Granted,
it is full of tricks;
but tricks
are for kids.

cessing programs as *LeScript*, *Volkswriter*, *MultiMate*, and even *Scriptit*. *MacWrite* just does not offer the flexibility or ease of the others.

3. The Trash Can feature is unreliable. I've put folders in it, and even though I never empty the Trash, the files are gone the next time I use the disk.

4. *MacPaint* is probably the neatest computer toy I've found to date. It would be best used by pre-high school kids who would otherwise be standing on street corners.

5. The "For Sale" sign is a one-page graphic I created. The computer forced me out of the program five times to save the file to a disk that had 250K of space left on it. I had to make 11 disk changes to save and come back into the folder. In fact, it took 7 disk changes to boot the computer and load a single one-page document, taking almost 2 minutes. The addition of a second disk drive would help, but nonetheless, until the machine gets more memory and a hard drive, it is not useful in a place of business.

Thanks for a fine magazine.

Jere F. Stahl
York, Pennsylvania

Glad to hear of your many positive experiences with the Macintosh. I still think it'd make a great peripheral for my XT. I'll pay the shipping.—Ed.

(continued)

LETTERS TO PC

Crystal Frequency

I am tackling with great enthusiasm the project described by Laurence V. Marks in his article "Getting Set for Real Time" (PC, Volume 3 Number 4). However, I have run into a snag. The parts list specifies use of a 32,768 kHz crystal, the schematic seems to confirm this (32,768 kHz), but the text (page 159, item 4) says 32.768 kHz. I have been unsuccessful in locating a supplier for either frequency crystal.

Could you please let me know what the

Every professional
must decide
when to pay
for the work
of others.

correct frequency is and where I can get one. I am looking forward to having great success with the project and appreciate your inclusion of it in *PC Magazine*.

Peter D. Hardy
Hingham, Massachusetts

Laurence Marks replies:

The correct value is 32,768 Hz. This is equivalent to 32.768 kHz, as correctly cited in the text. The k is used here in the engineering or scientific sense, to mean 1,000, rather than in the computer sense, where it means 1,024.

This is a fairly common crystal, available from several firms that supply hobbyists. It is also used in digital watches. In fact, one individual who had the other parts on hand used a crystal removed from a watch. It worked just fine.

Staying on Top

Gerald M. Weinberg's Guest Editorial raised many interesting points ("The Hidden Costs of Software," PC, Volume 3 Number 10). However, he makes it seem that only "old-timers" need to investigate new things or to choose between buying a program and writing one.

Say goodbye to the Tower of "APPLE" Babel

W to APPLE to IBM to APPLE

File Transfers
are easy as pie
with
APPLE-TURNOVER™



READ, WRITE, and FORMAT Apple® II DOS 3.3 and Apple CP/M disks in your PC or most compatibles.

No need for exasperating serial links or modem madness. Leave your Apple where it is. All formatting and file-transfers are easily accomplished on your PC.

The APPLE-TURNOVER package consists of a half-sized card, friendly supporting software, and complete documentation. \$279.50.

See your dealer or call for information.

Vertex
systems inc.

INNOVATION IN MICROCOMPUTER PRODUCTS

Dept. M, 6022 W. Pico Blvd.
Los Angeles, CA 90035
(213) 938-0857

Apple is a registered trademark of Apple Computer Inc. IBM is a registered trademark of International Business Machines Corporation.
CIRCLE 132 ON READER SERVICE CARD

New dimensions in Bible study.



THE WORD processor

the complete KJV Bible on
disks \$199.95 *

TOPICS

an index to over 200 Scripture
subjects \$49.95 *

* plus \$3 postage/handling

For information contact:

Bible Research Systems

9415 Burnet, Suite 208
Austin, TX 78758
(512) 835-7981

"Software for personal Bible study."

Requires APPLE II +, IBM PC
and compatibles, TRS80,
CP/M 2.2 (Z-80), KAYPRO,
OSBORNE, COMMODORE 64,
Z-100.

CIRCLE 106 ON READER SERVICE CARD

PC MAGAZINE • AUGUST 21, 1984

GREAT PRICES! GREAT SERVICE!

If you're looking for a great deal on business software, 800-Software is hard to beat. We became one of America's largest software marketers by offering great prices—and a lot more.

Here are some of the reasons to buy from 800-SOFTWARE:

- **LOW DISCOUNT PRICES.** Generally 40-50% off suggested list price.
- **FAST DELIVERY.** Our giant inventory makes this possible. (We can provide overnight delivery!)

■ **FREE TECHNICAL SUPPORT.** Call our helpful and patient experts.

■ **RELIABILITY AND REPUTATION.** Some of our best customers are America's biggest corporations, including IBM, Hewlett-Packard, G.E. and Honeywell. Also, we fully guarantee every product we sell against defects.

■ **EASY TERMS.** We accept purchase orders from qualified organizations.

CHECK OUT THESE INCREDIBLE SOFTWARE PRICES:

AMDEK™ MONITORS	CALL	MICROSOFT® WORD	
AST 6-PACK PLUS™	CALL	W/MOUSE	\$359
CROSSTALK™	\$105	MULTIMATE™	\$299
dBASE II/III™	CALL	MULTIPLAN™	\$149
EASYWRITER II		NORTON UTILITIES™	\$ 59
SYSTEM™	\$195	PFS: FILE/GRAPH/	
4-POINT GRAPHICS™	\$129	WRITE/REPORT™	\$ 85
FRAMEWORK™	CALL	QUICKCODE™	CALL
HAYES		RBASE 4000™	\$329
SMARTMODEMS™	CALL	SUPERCALC® 2	\$159
HERCULES GRAPHIC		SUPERCALC® 3	\$219
CARD™	CALL	WORDSTAR®	CALL
INFOSTAR™	CALL	WORDSTAR®	CALL
IUS ACCOUNTING		PRO. PAK	CALL
MODULES™	\$299	VOLKSWRITER	
LOTUS 1-2-3/		DELUXE™	\$179
SYMPHONY™	CALL	PLUS MUCH, MUCH MORE!	
MAXELL™ OR MEMOREX™			
DISKETTES	CALL		

800-SOFTWARE IS READY TO SERVE YOU.

TO ORDER CALL TOLL-FREE: 800-227-4587 OR 415-644-3611

- ☐ Dealer inquiries welcome.
- ☐ Quantity discounts available through our National Accounts Program.
- ☐ Purchase orders accepted. Please call in advance.
- ☐ Call for shipping charges. Overnight delivery available.
- ☐ We do not add surcharge for credit card purchases.
- ☐ Prices may change. Above prices are for IBM-PC and compatibles.
- ☐ International orders welcome: TELEX #751743 800-SOFTWARE UD
- ☐ Computer Key Word "GO-ER".

CA residents add sales tax.
©Copyright 800-SOFTWARE 1984



800-SOFTWARE

940 Dwight Way, Berkeley, CA 94710

LETTERS TO PC

I'd like to point out a small error in the piece. He stated that before the federal government set the speed limit at 55, Nevada was the only state with no official top end on the highways. Please add the vast, fourth largest state of Montana to your list of those states with no speed limit. Montana law still states that your daytime speed shall be reasonable and prudent, based on vehicle, driver, and road conditions, rather than an arbitrary number.

Warren-Albert Weber
Great Falls, Montana

Simple Drive Solutions

Paul Somerson's program in the User-to-User section on copying with one drive was great ("One Drive Blues," PC, Volume 3 Number 8, page 406). It helped me understand DOS and batch files.

If Somerson writes anything else, please keep me informed.

Merrill M. Knopf, M.D.
Long Beach, California

Paul Somerson and contributing editor Stephen Manes are busy working on half a dozen computer-related books. Look for them later this year.—Ed.

Correction:

An error appeared in "A Trio of Mailing List Managers" (PC, Volume 3 Number 9). *Catalist*, from Automation Consultants, International, does in fact provide an option for browsing through the data file and retrieving records by name, partial name, or entry number.

How to Write to PC

Do you have a comment, compliment, or criticism about something you read in PC? A question you'd like to open up to other readers? Send it to "Letters to PC," PC Magazine, One Park Avenue, New York, NY 10016. We are not able to answer letters personally.

All letters become property of PC Magazine and may be subject to editing. We cannot print letters that do not include a name and address.

Buy Our
Software...

FREE

TASC MASTER
Profit Systems, Inc.
© 1983 Profit Systems, Inc.
All rights reserved.



And Make One IBM PC™ Worth Nine

TASCMASTER™ SOFTWARE does that by converting PC-DOS to CONCURRENT PC-DOS thus enabling you to create up to 9 tasks and run up to 9 programs simultaneously. **TASCMASTER™ DOES THE WORK OF NINE.** While you are working with a task on the screen other tasks are working for you.

To give you every board you may ever need for your IBM PC we include with TASCMASTER™ SOFTWARE a powerful MULTIFUNCTION board **FREE!**

TAKE YOUR CHOICE OF:

ADDRAM ELITE™ FEATURES or ADDRAM PLUS™ FEATURES

- asynchronous (Serial-RS232C) communication adapter
- real time clock/calendar
- parallel printer adapter
- 64K to 512K memory with parity "no piggyback" and—all on one board
- With 64K memory installed
- two asynchronous (Serial-RS232C) communication adapters
- real time clock/calendar
- 64K to 512K memory with parity "no piggyback" and—all on one board
- With 64K memory installed

With RAMDISK™ and RAMPOOL™ SOFTWARE, TOO.



Optional MULTI-TASCMASTER™ SOFTWARE enables the addition of MULTI-USER capability to the IBM PC by connecting additional terminals to the serial ports, and integrates with TASCMASTER™. **YOU NEED TASCMASTER™ SOFTWARE** with the *free* multi-function board to make ONE IBM PC worth nine.

Available through personal computer dealers. For further information or name of local dealer call:

Profit Systems, Inc. 

30150 Telegraph Rd. • Birmingham, AL 48010 • (313) 647-5010

IBM is a trademark of IBM Corporation.
(TM) indicates trademark of Profit Systems, Inc.
PC-DOS is a trademark of IBM Corporation.
Copyright 1983 Profit Systems, Inc.

CIRCLE 152 ON READER SERVICE CARD

Pick up a SixPakPlus™

Introducing... **SixPakPlus™**, the refreshing new **384KB multifunction card!** In response to the changing needs of the IBM PC and PC-XT marketplace, AST Research, Inc. is proud to announce the latest addition to our line of multifunction enhancement products, the **SixPakPlus!** This new product is the result of extensive marketing research into the needs of IBM PC users whether they have the original 64K system board, the newer 256K system board, or the PC-XT. The

SixPakPlus has been engineered to meet these needs at a competitive price while maintaining AST's high standards for quality and reliability.

The **SixPak**, as we like to call it, could have been named for the six banks of RAM on it. However, we like to think that it was named for the six functions of the card.



for your IBM® PC.

The features of the **SixPak** include:



1. RAM memory starting at 64K, user-expandable in 64K increments to 384K. This makes the **SixPak** ideal for the PC or PC-XT with a 256K system board; 384K on a **SixPak** added to 256K on the system board yields 640K, the maximum addressable user memory in these systems.

2. One Serial (async) communications port, configurable as either COM1 or COM2, for use with serial printers, modems, a "mouse," and other serial devices. The serial port has on-board jumpers for easy management of the RS-232C lines, simplifying the wiring of cables in many installations.



3. One Parallel (printer) port, configurable as LPT1 or LPT2 (LPT2 or LPT3 when the IBM monochrome card is installed), for use with the IBM/Epson and other compatible printers. The port is compatible with IBM diagnostics.

4. A Clock-Calendar with battery backup, featuring an easily replaceable Lithium battery and a quartz-controlled timebase for a high degree of accuracy.



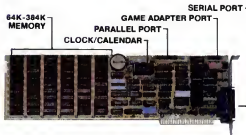
5. An optional IBM-compatible Game Adapter port, for use with an IBM-type joystick. In conjunction with application programming, this game port may be used for cursor control, in generating graphics or for playing games at the end of your work day!

6. Every **SixPak** comes with an AST SuperPak utility diskette which includes SuperDrive and SuperSpool, the most powerful disk emulator and print spooler software you can get. These programs will greatly enhance the throughput of your PC or PC-XT by emulating disk drive and printer access at RAM speeds rather than the normal slower speed of mechanical devices. SuperPak is the first of such software to be compatible with both DOS 1.1 and DOS 2.0.



Most important of all, the **SixPak** comes with the AST "Plus," AST's unsurpassed reputation for quality, reliability, after-the-sale support, and overall design excellence that gives our products the best price/performance ratio in the industry! Hence the name, **SixPakPlus**!

AST products are available from Computerland, Entre', ComputerMart, and selected dealers worldwide. Call factory if your dealer does not have the AST products you want.



AST

RESEARCH INC.

2121 Alton Avenue
Irvine, California 92714
(714) 863-1333 • TLX 753699 ASTR UR
Dealer Inquiries Welcome
CIRCLE 101 ON READER SERVICE CARD

PCjr. WILL HELP YOU...Mind your business...Computerize your office...Buy a printer...Turn your PCjr into a word processor...**Learn** American History...Talk to your sales rep in Des Moines via CRT about his new sales quota...**Access** Dow Jones, The Source, Compu-serve and other public net-



works...Be your own bank teller...Write The Great American Novel...Purchase the right monitor...“**Cluster**” your PCjr. with a PCXT...Go on a diet that works (?) (!)

...Study Euclidean theory...**Prepare** for your visit to the IRS...Balance your checkbook...Teach your PCjr to sing in harmony...Fight off invading aliens during your lunch hour...**Computerize** your patient profiles...**Track** last month's inventory of steel ball bearings...Plan your vacation...**Find** PC software that's interchangeable with your PCjr...List your tax exempt expenses for the year...**Project** the amount of oil you will use in your furnace...Decipher your phone bill...Out-



of your cross-country **Organize** a little cover when Venus and to the sun...Turn your PCjr into a Picasso or Van Gogh...Save money when buying new peripherals for your PCjr...**Manage** your database with dBase II...Catalog-shop with Compu-Card...Write memos...**Upgrade** your system...Cure insomnia with a new game you can play at midnight...Make calculus as easy as 1, 2, 3...Create bar charts to tell a story...**Expand** your system with two disk

line the itinerary business trip...league...Dis-

Mars are closest

drives...Organize your library...Set up a national sales meeting...**Review** the newest product releases from your living room...Improve your animation and sound better grades in papers with no spelling new printers...Play challenging new games...Change operating systems...**Create** personalized stationery...Give pre-schoolers a head-start in computer learning...Eat, swing, jump, punch and blast better with winning game tips...Choose a computer camp...**Balance** home expenses. MAKE YOUR PCjr YOUR MOST IMPORTANT TOOL!



business...**Add** to your PCjr...Get school...Write errors...**Evaluate**

SUBSCRIBE TO PCjr.—We'll help you mind your business and make computing entertaining, educational and functional!



P.O. Box 2450, Boulder, Colorado 80322

YES! I want to subscribe to PCjr. for:

☐ One year (12 issues for \$14.97. I SAVE 40%!

☐ Two years for \$27.97. I SAVE 44%!

☐ Three years for \$38.97. I SAVE 48%!

Savings based on full one-year subscription price of \$24.97.

Mr./Mrs./Ms. _____
print full name initials

Company _____

Address _____

City _____ State _____ Zip _____

Check one: ☐ Payment enclosed ☐ Bill me later

Charge my: ☐ American Express ☐ Visa ☐ MasterCard

Card No. _____ Exp. Date _____

Add \$8 per year in Canada and all other foreign countries.
 Please allow 30 to 60 days for delivery of first issue.

Bi-Graphix™ does more... and here's the proof!



Bi-Graphix™

Bi-Graphix I replaces both the IBM Monochrome Display/Printer Adapter and the Color/Graphics Adapter Card. It will also allow graphics to be displayed on the IBM Monochrome Monitor.

No modification is needed to run standard graphics software on the IBM Monochrome Display.

Monitor and mode selection is done easily by the flip of a single external switch. With two 9 pin output connectors you can have the IBM Monochrome Display and a color monitor connected simultaneously. Switching between the two monitors can be performed through software.

With **Bi-Graphix I** you can run Lotus 1-2-3 with the IBM Monochrome display, and enjoy the benefits of superior text quality and graphics without sacrificing compatibility.

Bi-Graphix II is a piggyback card with 128 k of memory. By installing Bi-Graphix II onto Bi-Graphix I you will be able to reach resolutions of 640 x 400 in 16 colors, using any standard high resolution color monitor. Resolutions of 720 x 700 can be attained on the IBM Monochrome Display.

PC+ and Coloplus are trademarks of Frederick Electronics.

Hercules is a trademark of Hercules Computer Technology.

Graphics Master™ is a trademark of Tecmar, Inc.

IBM is a registered trademark of International Business Machines.

1-2-3 is a trademark of Lotus development Corp.

PGS is a trademark of Princeton Graphics Systems.

Bi-Graphix I and Bi-Graphix II are trademarks of PC components.

	PC Components— Bi-Graphix	IBM—Monochrome/ Printer Adapter	IBM—Color Graphics Adapter	Hercules Composite, High Resolution—Graphics Card	Tecon— Graphics Master	Princeton Systems— Multitasking Board	STB—Graphics Plus	PC+ Products Coloplus
100% compatible with the IBM Monochrome Adapter Board, IBM's highest quality text mode	YES	YES			YES	YES	YES	
100% compatible with the IBM Color Graphics—for RGB and composite video monitors, lightpen	YES		YES		YES	YES		
Operate standard IBM Color Graphics software on the IBM Monochrome Display—(Lotus Graphics, etc.)	YES					YES		
Connect two monitors simultaneously and switch either by software or an external switch	YES				YES			
Graphics resolutions on the IBM Monochrome Display of 720 x 700, includes advanced software support	YES		YES					
Graphics resolution on an RGB Monitor of 640 x 400 with 16 colors, includes advanced software support	YES			YES				
Requires device drivers to operate Lotus 1-2-3 Graphics on an IBM Monochrome Display	NO		YES	YES		NO		
Includes a standard IBM Parallel Printer Port	YES	YES		YES		YES	YES	YES
Operate with a standard television set	YES		YES	YES	YES			

PC Components, Inc.

1916 Welsh Road, #6, Philadelphia, PA 19115
Telephone: 215-934-6990

CIRCLE 100 ON READER SERVICE CARD

Dealer Inquiries Invited

Missing Pieces of PC-DOS

Norton looks at other manufacturers' versions of DOS and finds several useful utilities that IBM left out of the operating system it customized for the PC.

I've mentioned now and again that some pieces are missing from the version of DOS that we get from IBM.

As you probably know, the DOS that we all know and love comes from Microsoft. It was more or less created specifically for the IBM PC, but IBM didn't manage to acquire sole ownership of it. Microsoft owns DOS and licenses or sells it in various forms to various computer manufacturers, including IBM. The computer maker can then pass on the standard DOS package to its customers, or it can customize the system.

The IBM version of DOS is customized in several ways; it includes several IBM-written programs and slight changes to the way some standard DOS programs work. When you look at the IBM-written programs closely, they have subtle but distinct differences in flavor. You can see the clearest example of this difference in TREE; BACKUP and RESTORE are two other IBM programs with unique aspects.

Obviously, IBM customizes its version of DOS so that PC-DOS can become the official IBM version, not because Microsoft won't do what IBM wants. (IBM can get just about anything it wants.)

Other Versions

Other computer makers have choices to make when they get DOS from Micro-

soft. They can take it in the standard non-IBM Microsoft version; they can, like IBM, modify it to suit themselves; or, like Compaq, they can modify it to function exactly like IBM's version. I've had a chance to see several other versions of



Peter Norton

DOS, so I've been able to learn about the parts that are missing from our version or that were added to other versions. Like IBM, which added the TREE, BACKUP, and RESTORE programs to DOS, some other computer manufacturers have also added a few programs of their own. Most of the ones that I've seen are specific to the particular machine. However, Texas Instruments added two I really like, one for listing and controlling

file attributes, another for listing file sizes with some snazzy features (like listing the total, and telling you if there is room to copy files to another disk).

The manufacturers that added utilities to DOS had the advantage of hindsight in deciding what functions would improve it. I've heard rumors that IBM has contracted for a brief exclusive—perhaps 2 or 3 months—on each new version of DOS when it is first released. Whether or not this rumor is true, in practice IBM's version of DOS is first, frozen long before most other computer makers' versions are prepared. This head start means that IBM users usually get the most bug-ridden version of DOS. We and IBM serve as the guinea pigs; if any bugs crop up, users of other brands of computers may be spared them. For example, back in the days of DOS 1.1, you may have heard of versions 1.25 and 1.26; they were essentially our 1.1 with minor revisions and fixes. The standard version of DOS is now 2.1, but some computer makers are shipping a version called DOS 2.11 that is, for all intents and purposes, 2.1 with a few bugs removed.

What Are We Missing?

In addition to a few extra bugs, DOS 2.1 users are also privileged to get a version with a few pieces missing. Two of them we can cover quite quickly: the

At long last, there is the business mind with the business system, effortlessly. Software so totally different and uniquely intelligent that it can create and carry through complex projects by itself. Extraordinary software with the capacity to adapt to a range of users' abilities, and grow in sophistication as their needs expand.

Introducing Smart Software from Innovative Software.™ There's never been a software system like it before. Nor is there anything else like it today.

That's because no other software has the capability to complete and repeat complex projects—from start to finish—on its own. Not by memorizing keystrokes (like a macro), but by adjusting to your project changes; and open-endedly performing dedicated applications.

Entire projects—spreadsheet to data base to graphics to word processing—can be completed without supervision; freeing your time for running your business, rather than running your business software.

In addition, Smart Software puts to rest, once and for all, the *ease-of-use* versus *power* dilemma, because this unprecedented software is as workable for beginners, as it is powerful for experts.

Smart Software was created to work for you, relentlessly. Structured to integrate with its smart mates, automatically. And designed to communicate with not-so-smart software, brilliantly.



For more information on the fully-integrated Smart Software System, call 800-GET-SMART or visit your local computer dealer for a demonstration.

The one-of-a-kind Smart Software System. Undoubtedly the most productive tool ever conceived for the business mind.

INNOVATIVE
Software

CIRCLE 272 ON READER SERVICE CARD

software that links



Introducing the software that makes communications a piece of cake.

EasyLink™ Instant Mail Manager software is probably the only communications package you'll ever need. Designed to blend in perfectly with Western Union's EasyLink™ Service, it makes the total communication process easy, instant, and automatic too.

All the right ingredients.

EasyLink Instant Mail Manager works with EasyLink Service to provide automatic access and transmission of almost any type or length correspondence over the EasyLink network. So sending mail instantly to virtually any other phone-equipped PC or word processor is a snap.

You can even reach people without equipment. Thanks to EasyLink's instant access to Western Union's Worldwide communications services.

EasyLink Instant Mail Manager also lets you access your company's computer or connect instantly to other business and information services.

The frosting on the cake.

EasyLink Instant Mail Manager is more than simple "send and receive" software. With it, you also have complete word processing capabilities. So you can easily create, edit and change the format of

your correspondence, then send it without ever changing software.

And, unlike most other communications software,

EasyLink Instant Mail Manager allows you to create and manage a permanent electronic address file

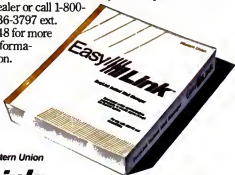
that stores hundreds of names and addresses. So you can instantly speed correspondence to anyone. Anytime.

If you need it, getting help is sweet and simple.

EasyLink Instant Mail Manager is set up to guide you step by step. From how to format messages to how you go about sending them.

EasyLink Instant Mail Manager Software and EasyLink Service. The perfect mix.

Available now at your computer software dealer or call 1-800-336-3797 ext. 948 for more information.



CIRCLE 246 ON READER SERVICE CARD

Western Union
EasyLink™

macro assembler (MASM) and the cross-reference utility that goes with it, CREF. Many computer makers consider these an integral part of DOS and package them with the operating system. IBM purchasers, as you know, must buy the macro assembler separately. But at least if we want it, it is available. Other parts of DOS are harder to come by.

For reasons that are a complete mystery to me, IBM has chosen to remove at least three useful parts of the standard DOS package and simply deprive us of them. They are LIB, FILCOM, and CIPHER. (If you know of any others, please write in and tell me.)

LIB

LIB is an object module librarian that is used in program development to manage separately prepared parts of a program.

If you've used any of the PC programming languages (other than interpretive BASIC), you're probably familiar with library files, which have filename extensions of .LIB. These libraries normally contain assembly language subroutines that are part of the standard support needed by any programming language. Most PC programming languages come with these subroutine libraries ready to use. The language compiler translates our programs into an object file in machine language. It then invokes these library subroutines for some routine functions. After compiling, we link edit our programs using the LINK program. LINK combines our programs' object files (produced by the compiler) with whatever parts are needed from the library to create a finished, usable program.

As you might expect, most programming languages have LIB to create and manage these subroutine library files. LIB will create libraries from scratch, list their contents, add new subroutines to them, remove subroutines (and make them available as separate object files), and also replace the old versions of subroutines with new ones.

If you are doing extensive and serious program development, you really could use LIB to create and manage libraries. It's a shame that LIB isn't included with DOS. There are, however, ways that you can get your hands on a copy.

One way is to buy a copy of the

It's a shame that LIB isn't included with DOS. There are, however, ways that you can get your hands on a copy.

Microsoft C compiler, which comes with LIB. Another way to get a copy of LIB—and a newer, better version than the one that comes with Microsoft C—is with the new Version 2 of the IBM Pascal Compiler. Still another way to get your hands on LIB is to buy the latest version of the Microsoft Pascal compiler. It is essentially the same as Version 2 of the IBM Pascal compiler, but it has some additional features.

FILCOM

The next item that is missing from our version of DOS is FILCOM, which is sometimes called FC or FILECOMP. FILCOM isn't an entirely separate program; it's the smart version of the utility we know as COMP. FILCOM has the simple, almost crude features of file comparison that we are familiar with in the COMP program. Like COMP, FILCOM will do a brute-force comparison of files—nice, but not sophisticated. What FILCOM can also do is make an intelligent comparison of ASCII text files. When we turn on this feature, FILCOM will not only report the first difference between two files, it will then search around, trying to find the next place where the files match again. If you are trying to find the differences between

two versions of something, that search-to-match feature is enormously useful. Also useful are a feature that tells FILCOM to ignore the difference between upper and lower case and one that tells FILCOM to ignore differences in "white space" (such as extra spaces and tabs).

These extra features of FILCOM are especially helpful in programming. While many changes in a report or a letter you've written might not matter much, the most minute and hard-to-spot differences in program source code could be critical. It's a grim fact that programmers often keep poor records of the changes they make to programs. If you ever have to track down such changes, FILCOM can be a lifesaver.

CIPHER

The last of the three missing programs is CIPHER, an easy-to-use file encryption program that we can use to protect our data. CIPHER scrambles our files based on an encryption key that we give it. After CIPHER scrambles the file, that file is unusable until it's unscrambled. I don't know anything about the encryption scheme CIPHER uses, but I would bet that it's safe against anybody but the CIA. CIPHER is easy to use because the commands are simple and because the process for unscrambling a file is exactly the same as the one for scrambling it. It's fast, too; converting a 100K file takes only 8 seconds. If you have computer data to protect, CIPHER is a handy program that can really do the trick for you.

Although I was able to tell you three honest ways to get a copy of LIB, I don't know of any proper way to come by either FILCOM or CIPHER. I have them only because I have copies of DOS for machines other than the PC, which are not easy for most people to get their hands on. Perhaps if we all complain loudly enough to IBM, it will give us these programs that we were owed in the first place. ■

Introducing the new Project Scheduler 5000™

Help! The demands of managing a project have you frantically juggling people and resources. It's getting more complicated and you're about to drop the ball on profits and deadlines.

Successfully managing one project can be difficult. Successfully managing two or three projects can be overwhelming. But now, help is here for you. With Project Scheduler 5000 you can precisely forecast, schedule, control and track large projects easily and quickly. You can replace your frustration with a sense of self-satisfaction from a project well managed.

Main Frame Power — Personal Computer Simplicity

Project Scheduler 5000 brings mainframe capabilities to your personal computer.

This new generation in scheduling software makes possible what was, until now, only a dream: true interactive use and immediate response to changes and additions. You can schedule over 5000 activities spread over 10,000 time periods. What this means is that you can manage the largest projects with ease. While you probably don't need this power on a daily basis, it's nice to know that you have room to grow.

Interactive "What If" Capability

"What if" scenarios are an important source of information that allow you to make the best decision after trying the alternatives. Now you have time for this kind of in-depth planning, because updating and modifying are so simple with Project Scheduler 5000.

A scheduling package should do more than schedule. With Project Scheduler 5000 you never take the risk of making guesses instead of accurate decisions.



... the best solution to effective project management

On Time On Target

Project Scheduler 5000 gives you all the information you need when you need it. Instantly, you know the status of your project.



At a glance, unique plot symbols will let you know whether or not the project is on time and on target and if not, why. Meeting performance goals will become a habit.

Project Scheduler 5000 keeps you constantly informed through its partial complete capabilities. Partial complete status is displayed, reported and used to calculate "value earned".

Accurate Resource Assignment

Extensive resource categories allow you to schedule more efficiently. Using these categories, you can assign to an activity an almost limitless amount of resources. In addition, these resources can be assigned at any point within the activity timeline providing the accuracy you need to build realistic resource profiles by person, labor grade, or other types.

Integration Of Multiple Projects

Keeping track of how a resource is used from project to project can be extremely difficult. Not with Project Scheduler 5000. The program can combine projects to give you a complete overview of where and when resources are used. Graphic presentations

can be condensed allowing you to visually compare multiple projects quickly and easily. Think of it! You can simultaneously manage several projects and be on time and meet or beat cost projections on each one.

Get The Picture Any Way You Want It

Hours, days, weeks, and months. You can select the resolution you need. In addition, you can break days into as many as 99 units to provide detailed shift or hour resolution. Get the big picture of your schedule on the screen or report by selecting a compressed format which displays up to 60 days, weeks or months of a project.

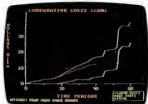
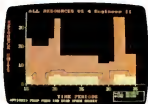
Fast Comprehensive Reporting

Communicating project information is no longer the time consuming task it used to be. An enhanced report generator synthesizes project information into reports on resource allocation, status, schedule and cost at both the project and the detailed activity level. You can interactively define special reports to give you all the detail you need. Reports and Gantt plots can be printed on hard copy or stored on disk for future use. Presentation quality graphics are available on a color plotter. Additionally, a spreadsheet interface provides labor and cost transfers for further analysis.

Integrated Graphics Power

Project Scheduler 5000 plus Graphics complements the outstanding scheduling and reporting features provided by Project Scheduler 5000. Using presentation quality financial line graphs, resource histograms, resource bar graphs and other high impact displays, Project Scheduler 5000 plus Graphics provides additional insight as you study in depth the effects of resource allocation, labor usage distribution and cost spreads.

With this control tool you can also track your original cost estimates against updated forecasts and expenditures. Project Scheduler 5000 plus Graphics will help eliminate the possibility that you'll overlook critical costs and deadlines.



Available for PC or MS DOS:

IBM PC or XT
TI Professional
Wang PC*
Grid Compass*
DEC Rainbow*

*Project Scheduler 5000 plus Graphics available 4th quarter 1984.



SCITOR

SCITOR CORPORATION
256 Gibraltar Drive
Sunnyvale, CA 94089
(408) 730-0400

Treasure Chest of Software

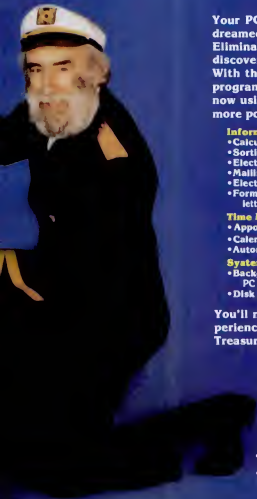
*jr*Captain™ and 1stMATE™



TECMAR

the power behind the PC™

with Tecmar's CaptainTM, multifunction boards



Your PC can finally do all those wonderful things you've dreamed about — with the Treasure Chest of Software. Eliminate the need for many desk top accessories when you discover Tecmar's new easy to use software technology. With the press of a key you access many Treasure Chest programs without having to exit from a program you are now using. This Treasure Chest of Software gives your PC more power for:

Information Management

- Calculator
- Sorting Program
- Electronic Rolodex*
- Mailing List
- Electronic Notepad
- Forms Generator - create letters, labels & reports

Time Management

- Appointment Alert
- Calendar Generator
- Automatic Time and Date

System Improvements

- Background Printing - frees PC for other work
- Disk Simulator in RAM

Hardware Diagnostics

- Memory Diagnostics
- Printer Diagnostics
- Clock-Calendar Diagnostics

Information Security

- Confidential File Coding

Use at Home

- Checkbook Balancer
- Inventory Management
- Banner Generator - prints letters 4.5 inches tall
- Tic-Tac-Toe
- and more !

INTRODUCTORY OFFER

*Rolodex is a trademark of The Rolodex Corp.

You'll never want to turn your computer off once you experience the ease of use, efficiency and enjoyment of the Treasure Chest of Software.

For the IBM PC: Captain & 1stMATE



- 0 to 384 KBytes of Memory on the Captain Board
- 0 to 256 KBytes of Memory on the 1stMATE Board
- Clock-Calendar with battery
- Serial Communications Port
- Parallel Printer Port
- Treasure Chest of Software

for the PCjr: the JrCaptain



- 0 to 128 KBytes of Memory
- Upgrade to 512 KBytes with addition of JrCadet Board
- Clock-Calendar with battery
- Parallel Printer Port
- Treasure Chest of Software

Tecmar, Inc. 6225 Cochran Road Solon (Cleveland), Ohio 44139-3377

Phone:(216)349-0600 Telex:466692

CIRCLE 501 ON READER SERVICE CARD

PC BRAND™ HAS UNBEATABLE

C has rapidly become the language of choice for serious software developers. The language of maximum portability across the spectrum of today's personal computers. The language which will most rapidly adapt to tomorrow's machines. The companion language to Unix™, the operating system destined for predominance. Major companies such as Microsoft and Micropro know this. They have switched to C for their applications development. How ready are you for the future?

PC Brand has the complete line of today's finest professional C tools. Not just the finest compiler, but libraries for graphics and screen design, overlay linkers, and program editors acclaimed as the best of their kind. It is a complete workshop of craftsman's tools which will turn you into a C professional in a hurry, capital equipment which will pay back your investment many times over.

Take the time to read this advertisement. You are sure to see the competitive edge these products will deliver.

LATTICE C

The Preeminent 16-bit C Compiler

You can find a more economic way to learn C. But if your interest is program development, Lattice C™ is the unparalleled choice. Byte said "the Lattice C compiler produces remarkable code . . . outstanding in terms of both execution speed and code compactness". After reviewing nine compilers for the PC, the *PC Tech Journal* unequivocally declared Lattice C "best for software development . . . it compiles fast and produces fast programs".

Lattice C is a full implementation of Kernighan and Ritchie, not a subset, and even offers extra features such as nested comments, 39-character variable names and extra compile time checks for some of C's subtler errors. The compiler comes with a full library of I/O routines which implement under MS™, DOS™ most of the Unix-compatible standards described by Kernighan and Ritchie.

Lattice C runs on virtually any computer using an 8086 or 8088 microprocessor, and we carry two versions for either PC-DOS™ or CP/M-86™. Create your source files with any word processor or text editor like Edlin or our Pmate™ and Lattice C will compile them into Intel 8086 object module format ready for linking with other modules by linkers such as DOS Link or our Plink86™.

Lattice C offers a choice of four memory models which allow the program designer to choose the right combination of efficiency and size for an application: a range between 64K and a full megabyte for program and data area size.

The documentation, which Byte says "sets such a high standard of excellence that others don't even come close", features sample source programs and covers the interface to assembly language and machine dependencies.

C's structured approach encourages development of tight, fail-safe functions which can be counted on to return reliable results every time. Local variables unknown outside of functions to safeguard against collision. Extremely powerful nested expressions which produce elegant, concise code.

Requires 128K RAM.

For PC-DOS: Product Code: S0100

For CP/M-86: Product Code: S0120 Our Price:

Suggested Price: \$500.00 **\$295.00**

HALO

A Spectacular Graphics Extension to Lattice C

PMATE

The Programmer's Word Processor

Pmate was designed for programmers. We'll wager that you cannot find a programmer who has discovered Pmate and moved on to something else.

Pmate is a full screen editor with ten auxiliary buffers for squirreling away pieces of text until needed. It uses single key commands to move the cursor, or text, or insert or delete, or rescue several thousand characters of deleted text.

It has a format mode for tab setting or wraparound and shaping when it's time to write documentation. Pmate lets you assign chains of commands or strings of text to single keys: one keystroke could set up the entire shell of a new C function, for example.

Pmate has variables, if-then statements, loops. It calculates, and converts decimal to hex to binary and back. You can write compact programs (called "macros") to delete comments, for example, or check syntax, or process long sequences of commands. Macros can alphabetize lists, do row and column math, perform a series of operations on multiple files, even summon other macros.

Put another way, Pmate is a text editor with its own built-in interpretive language. A language you can use to completely customize this text editor to your fancy. Possibly the most artistic, ingenious program you have ever seen.

Product Code: S0600

Suggested Retail: \$225.00

Our Price:

\$175.00

Halo™ will astound you. It provides a complete library of graphic functions which can be linked with your Lattice programs to create full-color charts, graphs, simulations, even animation.

Over 100 commands are at your disposal, including plot, line, arc, box, circle, plus single commands to produce bar graphs and pie charts. Pattern-fill and dithering commands give your graphics impressive texture and color mixes, rubber-banding draws shapes for interactive users, area moves produce animation, fill and flood commands paint areas. The newest version allows you to define your own world coordinate scheme, divide the screen into "viewports" (windows), and scale graphic figures automatically.

It's a long list of capabilities which make for an extraordinarily powerful product. In fact, Halo is so good that manufacturers of graphics boards and systems are adopting it as a standard graphics language. So it can bridge your application to other systems. CAD-CAM developers, especially, have embraced its device-independent approach for maximal portability.

Halo is a dazzling demonstration of why C has become the language of choice among programming professionals: its function library architecture means you can tremendously enhance your firepower by acquiring libraries of software like Halo with dramatic economy of time and money.

Requires IBM monochrome or color graphics card or equivalents.

Product Code: S0300

Suggested Price: \$200.00

Our Price:

\$125.00

PLINK86

Overlay Linkage to Expand

Software is becoming ever more sophisticated, which means more complex programs requiring large chunks of memory. But if you use extra memory, if you count on users to have expanded RAM, you will forego sales to those who do not.

Plink86 is the answer. It takes on the job of shoe-horning large programs into small memory. First, Plink86 acts as an alternative to DOS' Link. For a language like C which encourages design of separately compiled object modules in the Microsoft relocatable format, Plink86 pulls modules together into single compiled programs. But Plink86's overlay power is what has gained it a reputation as a miracle worker. It binds into the compiled program its overlay manager which knows how to swap modules of your large linked program between disk and memory, so that each can temporarily occupy the same memory space.

Unlike other linkers, the overlay manager acts on its own, needing no calls from the source program. Instead, Plink86's straightforward overlay description language allows you to describe your overlay structure in one place in your program — a structure

VALUES FOR 'C' PROFESSIONALS

Equip Your Workbench with Our Precision Quality Craftsman Tools

C-FOOD SMORGASBORD

A Menu of Difficult to Prepare C Functions

C is a language of function libraries: sturdy routines which your application can effortlessly reference to get the job done. But someone has to write them. It would take months to concoct and perfect the complex and useful servings which have been prepared for you and thoroughly tested in C Food Smorgasbord™.

Decimal Arithmetic: Functions to perform operations on binary-coded decimal (BCD) numbers of up to sixteen significant digits. Includes trigonometric and logarithmic functions, powers, conversions to strings, and much more.

Level 0 I/O Functions: Enable you to perform direct I/O operations for screen, keyboard, printer, and asynchronous port with no dependence on higher I/O functions to minimize memory usage and maximize speed.

IBM™ PC BIOS Interface Access: Allows you to get at the basic I/O services in the ROM BIOS not available through the normal operating system to get and set the video mode, cursor position, color and screen attributes,

keyboard shift, scrolling, printer channel and port status.

TIP: the terminal independence package: Lets you easily move programs to computers with different types of terminals.

There is a basket of delicacies beyond this brief list; a cornucopia to sample, any one of which will save valuable time and pay back far more than C-Food Smorgasbord's overall price.

Product Code: S0200

Suggested Price: **\$150.00**

Our Price:

\$115.00

All products operate on the IBM PC or PC/XT under PC-DOS and require no more than 64K of RAM unless indicated.

Prices, terms and specifications subject to change without notice.

Prices do not include shipping and handling.

You may freely use these products to create software applications for re-sale without additional licenses or royalty payments, provided your applications are not wholly or substantially replications of the products themselves.

Unix: TM Bell Laboratories / Lattice C and C-Food Smorgasbord: TM Lattice Inc. / MS: TM Microsoft Inc. / Halm: TM Halm Cybernetics / IBM: TM International Business Machines / Float87: TM Microfloat / Panel: TM Roundhill Computer Systems Ltd. / Plink86 and Prime: TM Picosoft Software / CPM-86: TM Digital Research

PANEL

Are You Still Coding Hand-Made Data Entry Screens?

Designing custom screens is intricate, time-consuming, and costly. It can make you the loser in competitive bidding. It can add weeks, even months to bringing your product to market.

But not when you use Panel™. Put Panel to work and you hire a superprogrammer for the minimum wage. Telling Panel your screen design is like using a word processor. You can add, move, copy, delete, and reshape fields with single key commands. The result? Finished C program code with field descriptors, color and highlighting, input editing by type of field, help keys, and warning messages.

Panel can also create a terminal selection program customized for your application, and gives you a utility to quickly test your finished screens. It even includes a multi-key data file maintenance program which interacts with the screen you design. All the tools you need to generate code for the trickier aspects of your application, or even to create stand alone data entry and retrieval products without any programming.

Panel routines are powerful. Unlike so many programs which make error correction difficult once a field is departed, Panel gives the user full field-

to-field movement for editing, and overtype or insert/delete within fields.

A truly superior productivity tool every developer should have.

Product Code: S0400

Suggested Price: **\$295.00**

Our Price:

\$235.00

FLOAT-87

Software Support for the 8087 Math Chip

Float-87™ is a library of floating-point math routines which are merged into a Lattice C interface library. The routines handle all arithmetic functions and the most frequently used transcendental or trigonometric functions, and pass all numbers to the 8087 to take advantage of its 80-bit data format.

Putting Float-87 to work with an 8087 can increase the speed of floating-point calculations by 40 times or more — and with greatly expanded accuracy. If you or your customers have an Intel 8087 math processor chip on board, this software will switch on its afterburners.

Product Code: S0700

Suggested Retail: **\$125.00**

Our Price:

\$100.00

Your Art of the Possible

permitting up to 4,096 overlays stacked 32 deep. And you don't have to re-compile to re-arrange the structure.

Plink86 is a two pass linkage editor. On the first reading it determines all modules which need loading, to insure greater flexibility in assigning memory segment addresses before the disk file is created on the second pass. It can even sub-divide its linked output into multiple files for programs which must span more than one disk.

But most of all it sets you free to write the comprehensive code today's users have come to expect without sacrifices to memory constraints.

Product Code: S0500

Suggested Price: **\$395.00**

Our Price:

\$315.00

CIRCLE 310 ON READER SERVICE CARD

You won't find an offer like this elsewhere. Exceptional prices and software fully supported by a knowledgeable staff specializing in 'C' and companion tools.

1-800-PC BRAND

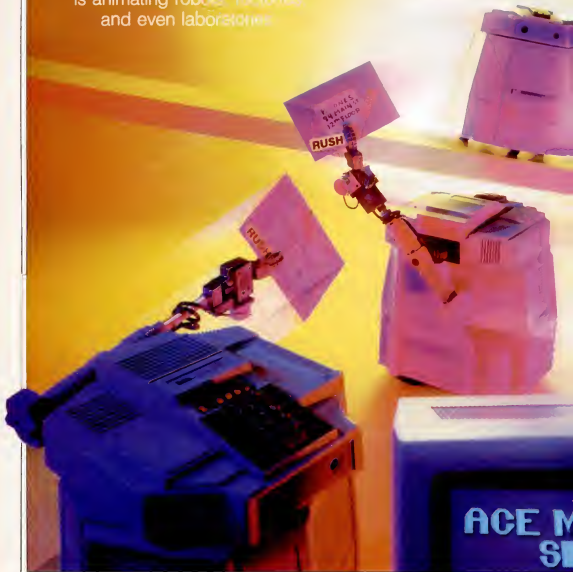
That's 1-(800) 722-7263. In NY State call (212) 410-4001.

Charge your purchase to MasterCard or Visa.

Or mail your order and check to

PC Brand, P.O. Box 474, New York, N.Y. 10028

The brainpower of the PC
is animating robots, factories,
and even laboratories.





COVER STORIES


NEURAL NETWORKS: ROBOTICS AND PROCESS CONTROL

Photograph: Dennis Chalkley



COVER STORY • BARBARA KRASNOFF

PROGRAMMING FACTORY ROBOTS WITH PCs



IBM has combined PCs
and industrial robots to create a
moderately priced assembly system that
can be easily instructed by
novices to do a variety of tasks.

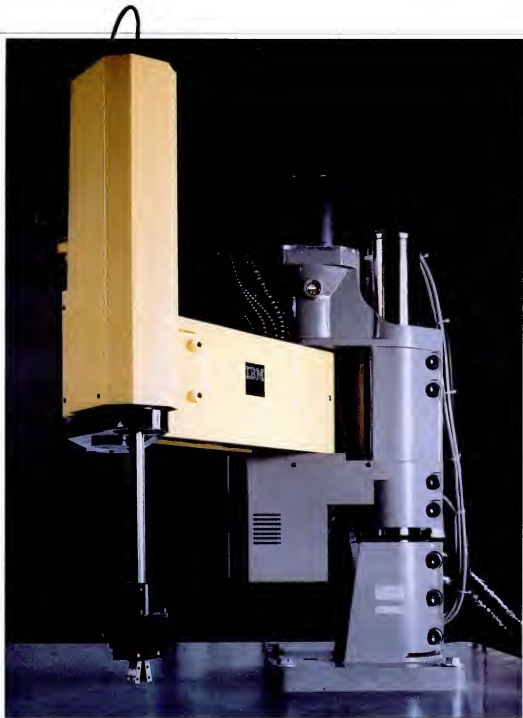


Photo by IBM. Courtesy of IBM

FACTORY ROBOTS

A common thread runs through the history of microcomputers and industrial robots. Until recently, both existed only in the stories of science fiction writers and in the minds of a few scientists and technicians. When the first computers and robots were built, many observers assumed that the primary uses for the machines would be scientific. Neither technology has developed in quite the way the futurists expected.

Microcomputers have indeed become important scientific tools, but they are most widely used in business and industry. Businesspeople are becoming increasingly familiar with the workings of personal computers and are coming to expect them to take over tasks once considered too complex for anything smaller than a mainframe.

Robots also chiefly inhabit factories rather than laboratories, and they are nothing like the humanoid metal creatures made so popular in novels and films (and most of them have not been built by mad scientists). They are becoming increasingly common and increasingly complex, ranging in ability from relatively simple, nonprogrammable "pick-and-place" automata to "intelligent" computer-driven machines that can analyze visual information and make intricate decisions. Many industries have found that robots cut production costs (they don't get paid overtime), increase efficiency, and result in a more uniform product.

Staying Competitive

More and more manufacturers are turning to robots as a way of staying competitive (the United States auto industry, battling for survival against highly automated Japanese manufacturers, is one example). In response to the new demand, robot manufacturers are concentrating on producing more sophisticated, flexible, and cost-effective machines.

IBM recently combined the technolo-

gies of robotics and microcomputers to produce an industrial assembly system that can be run by an employee without an engineering degree. Its 7535, 7540, and 7545 Manufacturing Systems, which are manufactured to IBM specifications in Japan, use ordinary IBM PCs as "teaching computers" that enable users to create or alter the robots' instructions with relative ease.

The three IBM models fall somewhere in the middle of the industrial robot intelligence (and price) range. Designed for a precision assembly operation, each robot consists of a jointed-arm manipulator and

IBM recently combined robotics and microcomputers to produce an industrial assembly system that can be run by an employee without an engineering degree.

a control unit that gives the manipulator its instructions. The three have somewhat different capabilities. (The 7535 is the simplest.) However, all three can move four ways; they have two swivel movements using the arm joints, a roll-axis movement that swivels the tool it is holding, and a vertical movement that raises and lowers the arm.

These automata are meant for assembling small to medium-weight products; they are not constructed to handle 2-ton car bodies. They are sophisticated enough

to respond to branch commands or error routines; if a part is defective or an unexpected problem comes up, the robot can receive information about the mishap and choose one of several ways of handling it. The robots' "repeatability factor" is ± 2 thousandths of an inch, which means that they will repeat a programmed action hundreds of times with only that margin of error.

In a typical application, a robot will pick a part off a pallet (a tray divided into distinct areas for each individual part) and place it onto a small revolving disk that moves it past a tester. The machine picks up another part while the first is tested. When a part has finished the testing cycle, the robot picks it up and conveys it to a pallet containing finished parts. If the part is defective, the controller receives a signal from the testing device, and the robot conveys that part to a separate "reject" pallet.

What sets these robots apart from the crowd is that perfectly ordinary PCs with 128K of memory teach them their moves. The PCs connect to the robots' controllers through an RS-232 asynchronous port.

The language that IBM uses to program the robots is called AML/Entry. It was derived from AML (short for A Machine Language), which was originally created for use with IBM's more sophisticated 7500 series robots such as the 7565. AML/Entry is much less complex than AML, which has 180 commands while AML/Entry Version 3.1 has 40 or so.

"Teaching" Robots

AML/Entry is an English-based, menu-driven language. IBM designed AML/Entry for novice programmers. The language makes full use of the PC's function keys, some of which it assigns to the robot's more basic moves, including up, down, and grasp. The screen shows a diagram of the workspace, and a cursor indicates where the robot's grasper is at the

COMPUTER GENESIS

In the beginning there were PCs. And now these PCs are begetting more PCs.

One recurring theme that has caught the imagination of many science fiction writers is the self-replicating robot—a robot that, in effect, gives birth to others like itself, with often nightmarish results. A much less frightening machine, the IBM PC, bringing this dream to life, has recently become a self-replicating computer. At a manufacturing plant in Boca Raton, Florida, IBM is using ordinary PCs and XT's to produce ordinary PCs and XT's.

The factory itself bears little resemblance to the one with gigantic wheels and gears in Charlie Chaplin's *Modern Times*, or the more controlled chaos of an automobile manufacturing plant. In fact, until about a year and a half ago, most of the process control in the factory was done manually, and the plant's machines were predominantly dedicated to getting each PC "kit" to its human assembler. Now, although the kits are still assembled by people, almost all other functions are handled by PCs and an IBM Series/1 minicomputer.

When an IBM PC or XT microcomputer is manufactured, it goes through five phases during its run down the assembly line: assembly, test, run-in, verify, and debug.

The PC kits, which are piles of parts waiting to be assembled, enter the factory area on assembly lines made up of hundreds of metal rollers. They have been placed on the line pretty much at random: a 128K PC (called a PC1) can be followed by an XT (PC2), which in turn can be followed by a 256K PC.

The first thing to do is sort the models

out: the PCs and XT's, the one and two drive machines, and those with increased memories. The first "intelligent" cog in the factory wheel they meet along the line is an IBM PC-XT hooked up to a laser scanner. As each machine reaches the scanner, it is caught and held while the laser reads the machine's serial number. This number allows the XT to route the kit to its assembly point by causing one of the assembly line's metal rollers to raise up slightly, stopping the kit and forcing it down one of four adjacent gates, eventually to end up at an assembly workstation.

In this way, PCs form a vital part of this plant's automatic control system. They are used in several factory locations, and efficiently handle the logistics of receiving and routing the embryo PCs to sorting and assembly areas.

Testing

The PCs not only push their cousins around the factory, they also test the systems to see if they're functional. After the routed kits are assembled by hand, the newly assembled PCs are tested. A PC "captures" the new computer and attaches itself to the machine's I/O. It runs a special diagnostic program that does a complete configuration check to see that all the parts for that model are present and functional. The results are read by the testing PC.

Assuming that all is well at this stage, the new PC is picked up by a Mobot (a robotic assembly machine) and placed onto a "run-in carousel," a large, revolving metal shelf that carries each

PC on a short trip. As it rides the carousel, each new computer goes through a self-testing sequence. At the end of its ride, the computer is removed from the carousel and loaded back onto the assembly line where it is retested by yet another PC for final verification.

Debugging

If a problem is discovered after the run-in, the new machine is immediately rerouted onto the debugging route, which takes the malfunctioning machine to a technician who runs a wand (attached, of course, to yet another PC) across the machine's serial number. The testing PC transmits the information to an IBM Series/1 minicomputer, which is coordinating the entire process. The Series/1 has read the data and has decided, based on probability, where the problem most likely lies. It sends that information to the technician's PC, so that he can replace the appropriate part.

Once the employee has replaced the erring part and has done a thorough recheck of the new machine, it is reintroduced into the assembly line at the beginning of the whole check and recheck procedure.

Until recently, IBM technicians were doing most of this testing manually. One of the three testing lines at Boca Raton has now converted to total automation, and the other two are expected to follow in September. Although human hands are still assembling and replacing parts of new IBM PC microcomputers, more and more responsibility is falling on the PCs themselves.—B.K.

FACTORY ROBOTS

NEW HARDWARE PROMOTES THE PC TO ABSENTEE FOREMAN

Two hardware companies have developed different approaches to letting the PC take long-distance control of the factory floor.

While it may be possible for PCs to spend time in the clean conditions of a factory that produces electronic equipment, it is not wise to use a microcomputer in more typical manufacturing environments. In cases where companies wish to use their PCs or XTs to perform process-control functions, it is usually necessary to keep the computer separated from the electrical noise, dirt, and other hazards of the factory floor. In other words, the microcomputer that controls the machinery cannot be placed near that machinery. This situation has created the need for specialized, long-distance interfaces between the computer and the work place.

RS-422

One solution to the problem is offered by Opto 22, a manufacturer of data acquisition and control equipment. It is

now marketing an RS-422 serial port card, the AC-422, for the IBM PC and PC-XT.

RS-422 is a communication protocol similar to its more common cousin, RS-232. RS-422 differs primarily in the way that electrical impulses move over the wires. Where RS-232 uses one wire for transmission and one for reception, RS-422 uses separate wires for positive and negative impulses in each direction.

The major advantage of RS-422 is its ability to survive transmission over long wires. RS-232 wires are generally limited to runs of 200 to 300 feet, depending on conditions and on the quality of the circuitry at both ends. RS-422, however, is normally considered useful through wires up to 4,000 feet long. This makes RS-422 extremely valuable, for instance, when a printer needs to be located at one end of the factory and the computer that controls it at the other. RS-422 is also widely used in data acquisition, since the protocol allows the various sensors to be located wherever they are needed.

RS-422, however, is not suitable for certain tasks. For example, RS-422 does not support the signaling that a modem needs. Low-end printers, plotters, and other devices have not generally been made available with RS-422 interfaces. Minicomputer equipment, however, often has an RS-422 port.

PC/STD

A California electronics firm called rmac has approached the problem in a different way. It is marketing the PC/

STD Link, two circuit cards connected by a ribbon cable that allows users to link their PCs and peripherals using the company's STD Bus structure.

According to the company, the PC/STD Link employs a direct parallel data path that is capable of providing a connection at direct-memory-access speeds between PC software and peripherals up to 200 feet away. By using the bus, which interfaces with a factory's automation, a PC can monitor and control a variety of process systems in the computer-dangerous environments common to manufacturing plants.

According to rmac, the PC/STD Link includes a PC interface that connects to the PC's I/O, an STD bus control interface, which directly controls and monitors the bus signals, and mailbox ports that handle high-speed PC-STD data transfers. The link also isolates the PC from electronic interference and provides data-purity checking.

The company strongly promotes the use of PCs in conjunction with manufacturing equipment and is marketing a bus enclosure, called Mac Pac, that houses up to 12 of their STD Bus circuit cards, a power supply, and a cooling system.

Considering the versatility and popularity of the IBM PC, it's likely that manufacturing industries will be using more and more in the manufacturing process. By producing new interfaces through which the PC can be involved in process control, hardware manufacturers are benefitting both their customers and themselves.

—Jan Young and Barbara Krasnoff

PRODUCT FILE

AC-422

Opto 22
15461 Springdale St.
Huntington Beach, CA 92649
(714) 891-5861
List Price: \$155

CIRCLE 745 ON READER SERVICE CARD

PC/STD Link and Mac Pac

rmac
716 Capitola Ave., Suite G
Capitola, CA 95010
(408) 476-9637
List Price: \$1,295 each

CIRCLE 746 ON READER SERVICE CARD

same time that the robot is moving.

Before writing a program, you first experiment with the robot's movements on-line using menu functions, simple English commands, and function keys. The robot can be moved from spot to spot, as well as up and down, and the manipulator can be opened and closed. AML/Entry keeps careful track of where the robot is going; the on-screen graphics help you do the same.

Once satisfied that the automaton is doing what is intended, you can write the program that will guide the robot automatically, inserting the spatial coordinates that AML/Entry has generated into the program by pressing a function key.

AML/Entry has many safety features that prevent you from giving the wrong commands to the wrong robot. For example, if the robot or the controller isn't turned on, the system will immediately signal. If the system has already been configured for a different robot than the one in use, it will also signal and offer you the option of either changing the configuration permanently or changing it only for that work session.

After creating or editing a program, you compile it using menu choices. The program then creates a file that the controller can read.

According to IBM, once a robot is "taught" its job, the PC can then be removed from the factory floor and returned to its normal office duties. Unless a change in programming is needed, the robot's controller takes over.

The PC can also act as a host computer for a robot. The host program, which is written in BASIC, enables the computer to load programs for the robot, monitor conditions, parts, and counts. For example, the PC can become a process controller by holding in its memory different instructions for up to five separate jobs. The PC controls which job a specific robot should do, or which robot should perform

a particular function. It can handle up to ten robots; any more require a more sophisticated computer.

Logic Units

Several of these robots, along with their PCs, are now in use in an IBM manufacturing facility in Raleigh, North Carolina that produces, among other things, logic units for computer displays. One assembly line has been totally automated since January using five 7540s, one 7535,

Once a robot is "taught" its job, the PC can then be removed from the factory floor and returned to its normal office duties.

and several IBM PCs.

"There's a personal computer at each robot workstation," says Dick Knowles, manager of manufacturing engineering. A workstation is part of an assembly line. Along the line, robots take parts out of delivery cartons, assemble them onto a base-built unit, and then move the unit to the next robot, which does the same thing with another part.

"The PCs do two things," says Knowles. "We use them to program the robots and then download those programs to the robot controller. But they also do all of the station control. They monitor photo cell sensors, issue commands to gates and

stops; in fact, they monitor and control all of the station's activity."

Knowles asserts that although the PCs have been right on the factory floor, they have functioned perfectly. "Of course, this is not a steel mill," Knowles says. "It's a fairly clean, electronic assembly environment. But some of our worries turned out to be unfounded. We have had no noise problems, no electromagnetic interference, or dirt problems. The PCs have performed admirably."

To get the PC off the factory floor, IBM has come up with SIM 7505, a color graphics program that simulates the robot's movements in real time. The idea, according to IBM, is to allow executives to visualize the robot's most efficient path without having to leave their offices to manipulate the robot itself.

SIM allows you to trace the path of the robot arm from its starting point to the pallet that holds the parts and back to where the robot "drops" the part off. Separate graphics in the upper-right-hand corner of the screen show a simplified robotic "hand" or grasper as it picks up, holds, or drops a piece; another graphic shows the grasper's roll (twist).

You can, in effect, test a robot's program. Once you find that program satisfactory, you can load it into the robot for immediate use.

Training

To facilitate use of its robotic manufacturing systems, IBM began a 2-week course for new owners of the automatons at its Advanced Manufacturing Systems facility in Boca Raton, Florida. The IBM Robotic Assembly Institute, which has been in operation for about 2 years, offers its students classes in programming and operating the robots, the role of robots, how to integrate them into the workplace, and other pertinent topics.

The large laboratory connected with the Institute contains 10 IBM robots, both

FACTORY ROBOTS

BUILT TO LAST: THE IBM 5531 INDUSTRIAL COMPUTER

IBM has wrapped the components of an XT system in sturdier cases, added protective shields, and attached a thermal sensor to create a system that's tough enough for the factory floor.

The newest member of the growing PC family is more of a hardhat than a white-collar worker. IBM has recently announced the latest in its series of microcomputers: the IBM 5531 Industrial Computer, a "hardened" machine especially designed for the rigors of manufacturing use.

Although IBM prefers to call it the "Industrial Computer," the 5531 is actually a PC-XT that's been beefed up for the tough demands of the factory floor. The motherboard, disk drives, and adapters (with one exception that I will get to later) are plain-vanilla XT. The key difference is in the packaging.

What first struck me about the Industrial Computer was its color. No longer the familiar light beige, the new machine is a dark cinnamon brown, with the system unit, the monitor, and the keyboard all finished to match. Although hardly a giant technological leap forward, the darker shell does signal some significant differences underneath.

The Industrial Computer monitor is IBM's usual color/graphics monitor, inserted into a larger and tougher case. It features forced air cooling with vents on the back rather than on the top so that the dust and dirt of the factory won't fall as easily into the insides and foul the circuitry. The monitor also features a heavy, replaceable protective plastic shield in front.

The keyboard looks and feels like the standard PC keyboard. The difference, however, is that it is built with an internal membrane that prevents dust and dirt

from gumming up the works inside. Unfortunately, this keyboard can't be purchased separately from the Industrial Computer—at least not for now.

The Industrial Computer system unit is 1/2 inch taller and nearly 2 inches deeper than either the PC or the XT system units. Inside the cover is a completely redesigned frame with extra bracing and shock mounting where IBM believes it will do the most good. The motherboard is identical to the XT's motherboard. The Industrial Computer is delivered with a color/graphics card, a hard disk controller, a floppy disk controller, and a brand-new multifunction card.

Time and Temperature

The new multifunction card packages a serial port, a parallel port, a battery-powered clock/calendar, and a thermal sensor on a single card. The IBM representative explained to me that the card "saves a port" (as opposed to employing separate serial and parallel cards).

The thermal sensor is intended to protect the Industrial Computer from overheating. It continually monitors the temperature inside the system unit and closes a switch when the internal temperature exceeds the computer's design limits. IBM supplies a machine-language subroutine that reads the switch and gives the user the ability to write warnings into the software. Within 10 minutes of reaching the over-temperature condition, the sensor circuitry will halt execution of all programs, protecting, at least in part, the system unit. Unfortunately, the sensor isn't

able to shut down the computer completely.

According to IBM, use of the sensor-reading software is the user's responsibility. If you run the machine without continually monitoring the temperature, and if the machine gets hot and stays hot for more than 10 minutes, your programs are headed for the big bit bucket in the sky.

The multifunction card is specifically designed for the temperature specifications of the IBM 5531 and, therefore, will not be available for separate purchase.

Other interesting features in the system unit include a plastic cover for the floppy disk drive and hard disk opening. This cover can keep dirt and contamination from seeping in and, with an optional lock, prevent tampering. The system unit also comes with a toughened fan and a replaceable air filter at the left front corner of the system unit.

According to IBM, the Industrial Computer is designed to operate at temperatures between 39 and 115 degrees Fahrenheit. For use in most factories, this is a significant improvement over the 60- to 90-degree limitation on the PC. Remember, however, that this specification is for the system's internal temperature; that means for room temperature, the Industrial Computer may be usable between 32 and 90 degrees, give or take a few. The temperature sensor on the new multifunction board will remove all doubt.

In another important departure from the PC and XT, the power supply in the Industrial Computer is designed to withstand transient voltages as high as 2,500 volts and for as long as 16 microseconds. This



isn't a guarantee that the unit will survive a direct lightning strike, but it is substantial protection against the weird electrical things that can happen in a factory.

The IBM 5531, complete with keyboard and monitor, will sell for \$7,590, and deliveries are expected to begin in the fourth quarter of 1984. But there are limits. The 5531 still contains a hard disk drive and cannot be subjected to extreme levels of shock and vibration. Similarly, it's not explosion-proof, nor is it able to withstand a corrosive atmosphere. Instead, it is intended for use where only minimal care is possible, and it is likely to do very well in those circumstances.

In fact, the Industrial Computer is likely to find a home in many environments that are just a little too harsh for the PC and the XT. Warehouses, farms, and military installations are just a few of the places where this robust computer may be needed. —Jan Young

The specially hardened 5531 is designed for manufacturing environments where industrial equipment can be in close proximity to the computer. It is constructed to resist such common industrial hazards as dirt and dust, temperature fluctuations, shock, and transient high voltage.

the PC-compatible machines, and other, more advanced machines that interface with IBM's Series/1 computer. It is here that prospective and recent robot purchasers can gain hands-on experience in programming—without having to experiment on their own machines.

Mike Yankowski, a staff robotic instructor for advanced manufacturing systems at IBM, regularly teaches incoming students how to maintain and operate one of IBM's small industrial robots. According to Yankowski, it usually takes students about 2 to 3 days to pick up the basics of programming and using the robots. The rest of the course teaches them how to design parts for automation, and how to integrate the robot into the manufacturing process.

"The students are mostly those who will be teaching the robots," said Yankowski, "although a few executives come just to find out what the robot can do."

He says about 50 percent of the students who register at the Institute have never done any real programming before, but come away from the course fully able to handle their new systems. Yankowski added that "user groups" of former students come through the Institute about twice a year to update their skills or simply to say hello to their former classmates.

The microcomputer is just beginning to be integrated into industrial robotics and process control. As yet only a few robots can use microcomputers as hosts and/or programmers, and an equally limited number of manufacturing facilities employ micros to do more than administrative work. However, IBM has made a start with the PCs and the 7535, 7540, and 7545 robots; it may not be long before less expensive, less complex computers can take the place of the minis and mainframes that now run modern factories.

"We're moving toward an age where computers are becoming everyday things," Yankowski believes. ■





COVER STORY • ROBIN RASKIN

PCs, PEPTIDES, AND PROCESS CONTROL

Biochemists at the Merrifield Lab are relying on a PC's electromechanical talent to control and monitor the synthesis of peptides.

PCs AND PEPTIDES

One of the chief technicians of the Merrifield Lab at the Rockefeller University foregoes the traditional white lab coat. This disk-touting technician is an IBM PC, programmed to create, execute, and monitor the process of peptide synthesis. If it's a peptide (essentially a small protein) you're after, just submit your favorite recipe to this PC chef. It'll store your recipes, mix the ingredients, filter your end product, and shut down its entire operation if any part of the complex process goes awry.

The chemical compositions of proteins are the language of life itself, and synthesizing them requires the most precise of recipes. Remember Chemistry 101? Protein molecules are large, complex, nitrogen-containing compounds that are made by chaining together specific sequences of the 20 naturally occurring amino acids. These amino acid building blocks must be linked by strong peptide bonds.

Automating the Language of Life

In the modern lab, the creation of these "biological sentences" takes place in the mixing vessel of a peptide synthesizer. The synthesizer is a conglomeration of glass beakers, tubes, and valves. It's capable of taking specific amounts of chemical substances from their storage containers, combining them in a mixing vessel, and filtering the end products.

In 1963 Bruce Merrifield, who is the John D. Rockefeller, Jr., Professor of Chemistry at Rockefeller University in New York City, developed a method of solid-phase peptide synthesis. This now-famous technique links an amino acid to an insoluble resin. Alanine, glycine, tyrosine—one by one, these amino acids are coupled to each other while remaining bonded to the resin. The resin is washed with solvent after every coupling, which eliminates all the reactants and leaves the insoluble resin and the newly created peptide together as the end product.

The technique is time-consuming and repetitive. It requires the controlled release of various substances into the mixing chamber, carefully controlled mixing times, and a repetition of various chemical washes, solvents, and reagents. As a manual procedure, the job requires tremendous patience. When Merrifield developed the peptide synthesis technique, he knew it would be particularly suited for automation.

By 1967, Merrifield had developed his own simple, but ingenious, automated peptide synthesizer, a biochemist's ver-



Dr. Don Whitney helped to develop the PC-controlled peptide synthesizer.

sion of a "player piano." Truly digital in its conception, Merrifield's synthesizer was a forerunner to the PC-controlled synthesizer that's used in the lab today. The machine contained a large, rotating drum filled with peg board holes. Merrifield programmed the machine by inserting stopper pegs into certain holes. As the drum rotated, a peg would trip a mechanical relay releasing the proper chemical from its container. To change the pro-

gram, all that was needed was to change the pegs. This machine eventually gave way to a more sophisticated synthesizer, which was recently adapted for use with the PC. "Not only do we make peptides," explains Dr. Don Whitney, a research associate at the Merrifield Lab, "we still look for new processes to make them by." The PC will serve the lab well.

PCs for Process Control

Wherever there's a process, there must be some form of process control. Process control involves monitoring and controlling a piece of equipment. A process control computer must receive input from the external environment and correct or halt the process as necessary.

There are various types of process control. Sometimes a constant activity must be maintained—for example, an oven must be kept at a certain temperature. Sometimes the process must be kept at a constant speed, as on an assembly line. Sometimes, as in the case of peptide synthesis, a sequence of events must be executed. Merrifield's peptide-synthesizing PC must control the release of the chemicals, open and close the valves, control the mixing motor, and monitor all the sensors.

All that's required for process control is some sort of interface with the mechanism that must be controlled. With a little engineering work, PCs can be adapted to "talk" to anything, which makes them prime candidates for the laboratory's Most Valuable Process Controller award.

Whitney, along with Dr. Jim Tam, associate professor at the Merrifield Lab, envisioned a computer-controlled system that would provide the scientist with powerful routines to create peptide sequences. In addition, they were concerned with the PC's involvement in process control. "The key here is for the computer to know when there's an error so you don't ruin your synthesis," Whitney stresses. "If

you are up to 20 or 30 amino acids on your resin and you get a malfunction, you can ruin the entire synthesis. The computer has to be able to shut down if errors occur and tell you where things went wrong."

"Whenever the computer has nothing else going on, it is reading the sensors," explains Paul Silverman, the system's designer from the Rockefeller Electronics Laboratory. The controls help the researcher play Sherlock Holmes. For example, if a sensor does not detect liquid in a chamber where there ought to be some, the computer flashes an error message and shuts down operations. Immediately, the researcher suspects the corresponding valves. A specified-time parameter also acts as a control: if the sensor in the first metering column does not register liquid within the specified number of minutes or seconds, the computer shuts down the operation. Perhaps the nitrogen tank that pressurizes the system is empty or there's a valve malfunction. The computer can't monitor every detail, but it can reduce the number of possibilities to consider in the event of an error.

Hard-Working Hardware

For 5 months, Whitney, a skilled organic chemist and computer enthusiast, and Silverman, a sharp computer engineer with a keen sense of the scientist's perspective, worked together to create the PC-controlled peptide synthesizer. Today the lab can produce complex peptides without human intervention. Scientists can use the computer as a flexible research tool to create and file new peptide recipes. As I spoke with them in their offices at Rockefeller University, the PC was monitoring and controlling away. Opening valves, monitoring sensors, and executing a complex sequence of chemical reactions, the PC was the quintessential technician, providing excellent feedback and documentation as it whirled along.

Silverman's first order of business was

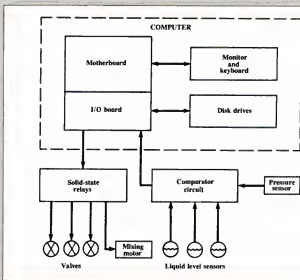


Figure 1: A block diagram illustrating the PC controls for Rockefeller University's peptide synthesizer.

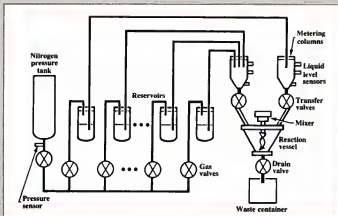


Figure 2: A schematic of the mechanical components of the peptide synthesizer. Peptide synthesis occurs in the reaction vessel. A PC controls the opening and closing of the valves and the duration of the mixing and monitors the pressure and liquid level sensors.

PCs AND PEPTIDES

to gut a commercial Beckman Peptide Synthesizer, an 8-year-old dinosaur that relied on punched mylar tapes to execute the sequence of events. Silverman replaced the Beckman synthesizer's electronic components with a single box containing solid-state relays. The total bill was a fraction of the cost of going out and purchasing a new state-of-the-art peptide synthesizer. In addition to saving dollars, the laboratory gained the flexibility of using the PC as a general-purpose tool.

The lab chose a standard IBM PC, augmented with a Tecmar Lab Master I/O board and a Tecmar Time Master board. The output lines of the I/O board control the relays to the valves and the mixing motor. The input lines monitor the liquid level sensors and a pressure sensor (see Figure 1).

The mechanical components of the old synthesizer were left intact. The mechanical process is straightforward (see Figure 2). Racks of bottles (reservoirs) containing the amino acids and various chemical reagents and solvents are pressurized by a nitrogen valve. These reservoirs deliver calibrated amounts of their contents into metering columns. The columns are equipped with sensors that monitor the fluid volume, and when the desired volume is reached, the transfer valve is opened, which allows the liquid to drain into the reaction vessel and mix with the contents of a second metering column. The resulting suspension is then mixed for a specified length of time and then filtered.

Modula-2 Software

Silverman wanted the program to employ a "hierarchical command language" that would give the biochemists the power to "create new commands from existing ones." He chose the exotic Modula-2 programming language to implement the system. The version of Modula-2 Silverman used translates a Modula-2 program to p-code. The system contains a p-

code interpreter that actually runs the programs.

Silverman carefully designed the program's structure to meet the chemists' needs. "I said to myself, 'What we have is a machine (the synthesizer) that does certain things; it's kind of like a processor. The chemists are kind of writing programs.' I wanted to give them the same tools a computer programmer has." The editor that Silverman built into the program lets the researcher specify new high-level commands by linking together the program's primitive commands. The pro-

Human intervention is not discouraged. When the computer is doing a mixing step, everything can be run on manual.

gram's translator takes this "text" and translates it to primitive codes. The execution of the commands occurs in the interpreter.

Silverman's program uses a menu-driven "shell." The routines allow the user to create new commands from existing ones, to add or remove commands from a file library, modify a command, list the contents of a library, examine the sensor readings, and actually execute the command or series of commands.

The library of commands resides on a single disk, with each command occupying a file. The disk also contains a file with

a directory of commands. The data entered by the researcher occupies a different disk, so different libraries can be used with the same program disk.

Programming Proteins

So how do you say "build me a peptide" in computerese? Each command defines a sequence of actions that the synthesizer performs. For each command, Silverman's system prompts the user to specify the necessary parameters.

The primitive commands correspond to the most fundamental operations of the synthesizer. In Logo, a primitive might be FORWARD or RIGHT; in BASIC it might be SOUND ON. In the programming of peptides, the primitive commands are equally simple. METER instructs the computer to take a certain amount of liquid from one of the reservoirs and deliver it to a metering column. The metering column contains sensors to measure the precise volume. TRANSFER allows the user to specify the number of minutes and seconds that should pass to allow all of the liquid to empty into the reaction vessel before a malfunction is reported. The computer controls the opening of the valves for that length of time, allowing the contents of the two columns to enter the reaction vessel. MIX lets the user specify the amount of time the mixing motor should operate. DRAIN allows the user to set the amount of time that should pass before all the contents of the reaction vessel are filtered out. REPEAT allows you to create a loop that will repeat the process until it reaches END. DISPLAY and WAITFORCR allow the researchers to type comments on the CRT and view them until the carriage return is pressed. In a lengthy synthesis these commands serve as place markers.

Strung together, these primitive commands create a template. Once you define a template in terms of primitives, you don't ever have to do it again. By naming

your template and storing it in a file, you can execute it by its new name. This process ultimately leads to a program that allows you to create a peptide by specifying its name.

The editor was designed to maximize the chemists' flexibility. Once a template is recalled, it is easy to modify any of the parameters. A partially specified template can be recalled and parameters added to make it complete.

I was lucky enough to watch as Don Whitney created a template with my name. So here's the recipe for ROBIN. METER from reservoir 17 until sensor 1 is hit or for 1 minute. Then TRANSFER for 1 minute and 1 second and then MIX for 1 minute. As I watched ROBIN form, I saw valves open and close, liquids fill chambers, sensors blink on and off, and the CRT screen display my program status in easy-to-follow steps.

"I've developed a large personal library to include files like alanine, arginine, aspartic acid. Many of the amino acids contain 100 or more steps," reports a satisfied Whitney. "The system is very compatible with the way a biologist thinks about this process. You slowly build up to higher-level functions. There's tremendous flexibility. I could program the instructions to make a peptide, save it on disk, come back in the lab, put in my disk, and type RUN to repeat the process."

Human intervention is not discouraged; rather, it is facilitated in the PC environment. "If you do a 100-residue synthesis, you need to fill the reservoirs and change solvents," explains Whitney. "We set it up so that when the computer is doing a mixing step, everything else can be run on manual. You can be preparing other parts of the process."

Silverman says that "by providing the chemist with the tools that computer programmers employ, a straightforward approach to control can be realized." He realized his program should be on a "high



Computer engineer Paul Silverman inserts the program disk that contains the commands for controlling the peptide synthesizer.

enough level so that it appears that a peptide synthesizer is being programmed and not a computer."

Reports Whitney, "Last weekend we made two peptides. For a standard solid-phase synthesis, we could complete five or six amino acid residues a day, with the computer running for 24 hours straight." Whitney is enthusiastic about the possibilities of a totally integrated lab. "I can use the word processor and will be using a database program. I have a DNA sequencing program I can't wait to try," he says. It's obvious that this particular PC will earn its keep around the lab.

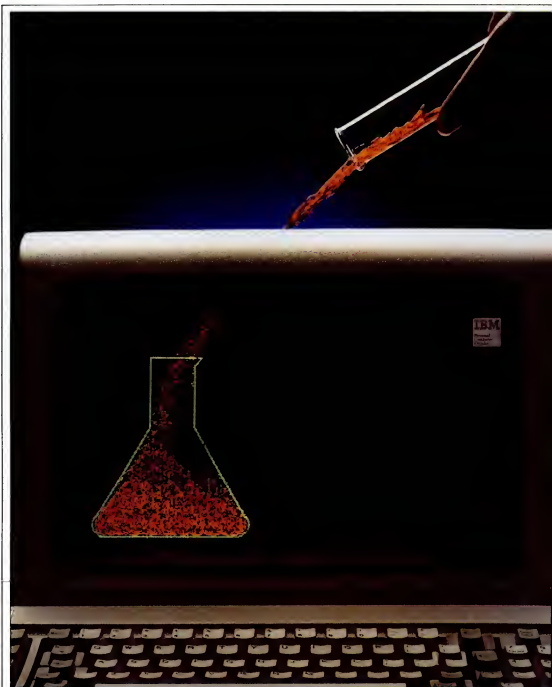
The Future

"Monitoring for error is one level of process control," says Silverman. "The next level would be to monitor what you are making: the reaction itself. Monitoring

for error is a good/bad type of process. If it's good, you continue. If it's bad, you stop it. Monitoring the reaction concerns itself with things like the product yield. There are more decisions and they are more complicated, but from a programmer's point of view, you only have to add in a few more primitive commands to give the chemists those powers."

"We have to figure out some way to detect the concentration of the amino acid in the reaction vessel," comments Whitney. "The computer part is now simple, but we don't have the instrumentation yet." I suspect the story of PCs and peptides has just begun. ■


Robin Raskin is a free-lance writer who is writing a book for computer engineering students to be published by McGraw-Hill next year.





COVER STORY • MICHAEL MUSKAL

A COMPUTERIZED NOTEBOOK FOR SCIENTISTS



LABTECH NOTEBOOK produces
printouts and graphs and analyzes data
in a matter of minutes.

LABTECH NOTEBOOK

Try to imagine juggling 20,000 oranges in 1 second.

Scientist Michael Wu isn't a juggler, but as a graduate bioengineer at the University of Pennsylvania, he faces a problem of that magnitude all the time. Wu has been trying to analyze the impact of firing 20,000 tiny electric bolts into a cell every second. Researchers in the hard sciences constantly tackle problems like this, problems that require innumerable complex measurements and the juggling of many variables. As technology grows, allowing for the ever-faster collection and manipulation of data, they are struggling to keep pace.

Now the traditional laboratory notebook has been computerized for the PC; a program named LABTECH NOTEBOOK, developed by Laboratory Technologies, is helping Wu and other scientists keep up with their tasks by compressing the entire research cycle into a single computerized process. (Laboratory Technologies originally began as a hardware producer, marketing a scientific computer called the LABTECH 70. But as the PC was upgraded, the company shifted its focus and began developing software for that machine.)

Traditionally many researchers used a digital recorder to record analog data and then played it back to examine the sections they wanted. This method produced a phenomenal amount of data, but, according to Wu, analyzing the information took any

where from 3 to 4 days of precious research time. Using NOTEBOOK, you can produce printouts and graphs within as little as 5 minutes, and the program can then run through the data analysis in a matter of minutes.

For researchers this program marks a real advance in the scientific process. Projects that once required minicomputers

recalling his days in the laboratory as a chemical engineer. "If you don't have a computer, this takes a lot of time. If you do have a computer, you have to program it to plot the data and that may take even longer. It may be harder to do the programming than to gather the data in the first place."

After gathering the data, he says, "you

Now the traditional laboratory notebook has been computerized for the PC; a program named LABTECH NOTEBOOK, developed by Laboratory Technologies, is helping scientists to compress the research cycle.

can now be monitored by micros, which results in both financial and time savings. Wu uses an expanded PC-XT, a color monitor, a Data Translation board, a printer, and NOTEBOOK software. The entire cost comes in at about \$10,000, compared with \$25,000 for an equivalent minicomputer system.

The Research Process

In developing the program, Frederick A. Putnam, president of Laboratory Technologies, examined the process of scientific research. Because it is composed essentially of constant repetitions, it can be divided into several standard areas, regardless of the type of experiment being conducted. "You collect the data and you immediately want to plot it," he says,

develop some understanding of what has happened in your experiment. You create a model, usually mathematical. Then you have to compare the experimental data with the model and graph that comparison. In most cases, you find that you want to go back and collect more data." The process of trying to bring data and theory into harmony is like the ascending spiral of the German philosopher Hegel, in which nearly every step involves going back to previous stages before climbing to the next level.

NOTEBOOK is designed to compress the entire research cycle so that the data analysis, which can take several months manually, will run in minutes. The program is written in three languages, FORTRAN 77, C, and MAGIC/L, a language



LABTECH NOTEBOOK

Laboratory Technologies Corp.

328 Broadway

Cambridge, MA 02139

(617) 497-1010

List Price: \$795

Requires: 256K, 2 disk drives or hard disk, DOS 2.0, color/graphics board.

CIRCLE 752 ON READER SERVICE CARD

developed by Arnold Epstein of Loki Engineering in Cambridge, Massachusetts. Putnam describes MAGIC/L as a very fast incremental compiler with a clean syntax that avoids the problems of some "reverse polish" languages (languages that use the form "1 2 +" rather than the more familiar "1+2" form). The fourth component of the package is a customized version of Lotus' 1-2-3 (available for an additional \$495), which facilitates graphics and tabular comparisons. *NOTEBOOK* also supports Lotus' recently announced *Symphony*.

Mouse Support

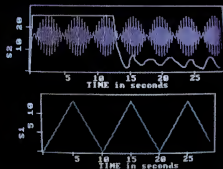
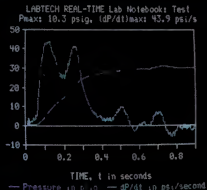
The program requires a data acquisition board to run. Currently it supports boards produced by Data Translation (to read more about this company, see "Cap That If You Can," *PC*, Volume 3 Number 4), Taurus Computer, Metrabyte Corp., and Acrosystems. Putnam says that Laboratory Technologies is discussing adapting the products of other board manufacturers. For quicker execution, the program also supports the Mouse Systems mouse, which connects to the RS-232 port. Because the software is designed on the IBM PC bit map, it may not run on all PC-compatibles.

In essence, *NOTEBOOK* automates each of the research steps that were once performed manually. The data acquisition board can control the instruments used in an experiment more reliably and quickly than a researcher can; the bit-mapped color graphic CRT is an efficient substitute for the older chart recorders and oscilloscopes used for viewing data; and the computer filing system provided by the 1-2-3 software is easier to use and more comprehensive than paper charts.

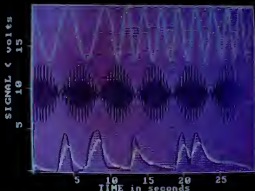
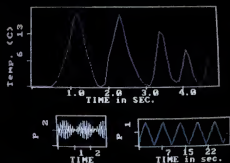
Easy Data Manipulation

Lotus' 1-2-3 also eases data manipulation and statistics with its built-in mathematical functions. *NOTEBOOK* includes a

Pressure, P and dP/dt



Above: A 1-2-3 graph of data, acquired by LABTECH NOTEBOOK, that plots time against pressure. The x-axis displays time in seconds; the y-axis measures pressure in pounds per square inch. Below: A LABTECH NOTEBOOK real-time display of incoming analog data.



Above: Three windows each show a different incoming analog signal. NOTEBOOK's windowing capability permits data to be plotted on separate graphs, each with its own scale. Below: Four incoming analog signals are plotted on a single graph.

The program is written in three languages: C, FORTRAN 77, and MAGIC/L, a very fast incremental compiler with a clean syntax.

nonlinear regression analysis that is integrated with I-2-3's graphics, which allows modeling and curve fits so that researchers can test data against a theory. This procedure is sometimes called "fiddling"; scientists often develop their theories by juggling raw data in this way. Putnam asserts that such fiddling will be faster when performed on a computer, which in turn will speed up the research process. The 2.0 version of I-2-3 also includes an integrated text editor for writing reports and technical papers—often the final step in a research project (and also the first step in getting experimental results published).

With the help of LABTECH NOTEBOOK, Putnam hopes, PCs will soon be participating in scientific research even more far-ranging than the applications discussed above. "I think we're on the verge of a major explosion in research," says Putnam. "The PC's penetration of the office is well under way, but that type of penetration is just beginning to happen in scientific and technical areas. Only now is the software finally available." ■

BREAK IT UP

Materials testing is a process any 5-year-old would love: How far can you push a piece of material until it shatters? It's as easy as 1-2-3.

Materials testing is the area of engineering that is most like a 5-year-old's dream: You pull, press, and force a piece of material until it breaks and then note the pressures and the period of time required to shatter it.

One of the first software packages that Laboratory Technologies translated from its LABTECH 70 computer system into the IBM PC format was the *Materials Testing Automation Program*. The transfer was fairly easy because the LABTECH had the same chips and structure that IBM eventually chose for its PC.

"One of the problems in developing software for technical applications," says Frederick Putnam, president of Laboratory Technologies, "is that in any given research lab, everybody is doing something different. But in the area of materials testing, the American Society for Testing Materials has developed standards. We took their standards and coded them."

Materials testing measures the mechanical properties of a solid or a liquid. The Laboratory Technologies software, which costs \$2,995 including a modified template for graphics and comparisons, is loaded into an IBM PC or XT equipped with an expansion card that increases its memory to 320K. A Data Translation data acquisition board is required to control the machine that will actually destroy the test material.

The data acquisition board controls

the testing machine, which breaks the material and sends an impulse to the computer, which notes the parameters. At the moment the material breaks, the time of separation is noted on a comput-

The testing program, based on a customized 1-2-3 template, allows the user to sort breakage data by any criteria.

erized graph, and the software automatically measures and inserts such standardized facts as yield stress, ultimate tensile strength, modulus, specific energy, elongation, gage length, sample diameter, full scale load, modulus offset, and cross head speed. The program provides for both multiple test averaging and data

overlays, says Putnam.

Off on a Tangent

Formerly, analyzing breakage data involved finding a tangent to the curve of time versus stress during the test. That tangent must be parallel to a line drawn through the point of breakage. To find that one tangent, the researcher would often move a straightedge ruler around to get the best fit by eye, says Putnam. The analysis of the data also involved computing the area under that complex curve—a task that sometimes meant graphing the curve, weighing the trace, and comparing it to a fixed weight of an already computed area. The manual process could be time consuming; the computerized version takes about 15 seconds.

The testing program, based in part on a customized 1-2-3 template, allows the user to sort the breakage data by test site, operator, or any other criteria. It also includes statistical spreadsheets and supports. The customized 1-2-3 template allows the program to compare tests from different customers, for example, and compute averages and standard deviations. It also allows a company to create formats that are adapted to its particular needs.

Two of the many advantages, says Putnam, are the recordability of the test data and the relative ease with which it can be presented to customers as a finished report. —M.M.





COVER STORY • ROBIN WEBSTER

A PERSONAL ROBOT GOES TO MARKET

BOB can walk, talk, and perform simple tasks. Once outside vendors provide this IBM-lookalike-on-wheels with a few more tricks, you may want to have him around your house.

BOB

Waiting in the wings to make an official appearance sometime in September is BOB, touted as the "first personal/home robot." BOB (that's short for Brains On Board) is either the ultimate in portable PCs or at least one reason why you shouldn't buy that shag carpeting for the living room.

BOB is the 3-foot-high offspring of Androbot, the San Jose-based company. Some readers may remember TOPO, the robot produced by the same company for educational purposes. TOPO was quite short and used wheels instead of legs.

TOPO was brainless; he contained none of the computer hardware that would allow him to make decisions about the world around him. Instead, users had to link up their own hardware before TOPO could do his stuff. But even so TOPO fared pretty well. According to Androbot, over 1,000 TOPO units have been sold.

Androbot's \$3,995 new baby is a different beast entirely. It's taken the Colby Computer idea (repackaging an IBM PC's innards in a portable box) to the extreme: BOB is a PC lookalike on wheels.

Beneath a cream-colored plastic exterior, which looks like it was dreamed up by someone influenced by Buckminster Fuller's geodesic dome concept, BOB uses an Intel 8088 chip and comes with 64K RAM, which can be bumped up to 640K if required. (BOB's exterior may change before the September launch.)

BOB's full name is BOB/XA, the XA

standing for "expandable androbot." And expandability is what this particular robot is all about. Androbot intends to market BOB as a robot prototyping system that comes with just enough hardware and software to make him walk, talk, and perform a few simple tasks. Independent hardware/software vendors will have to provide more advanced abilities.

The main motherboard is set vertically so that it fits into the torso of the robot. There are eight IBM-standard slots for add-on boards. In addition to the regular IBM-lookalike electronics, Androbot has included its own special hardware. A number of sockets can accept plug-in ROM chips, and a selection of specially designed circuits produce speech output, move BOB around, and react to data coming in via external sensors.

Sonar Vision

BOB comes with two head-based ultrasonic transmitter/sensors. These operate in sonar fashion. One sensor sends out an ultrasonic wave and detects any feedback; then the second sensor takes its turn. By computing the time taken for individual signals to go out and return, BOB can determine (using the parallax principle) where objects are located. This ultrasonic setup can be used to great effect during demonstrations of BOB's "follow-me" trick: This robot automatically rolls behind as its demonstrator walks from room to room. Additional ultrasonic sensors can be added for special applications.

BOB also has an optical sensor attached to his waist (designed basically for the same purpose as the bar-code reader in your local supermarket) and moves around by means of two electric motor-powered wheels. Power is supplied to the robot by two 12-volt batteries linked up to generate 24 volts.

A standard pushbutton telephone keypad is used to assign tasks, and somewhere in the final version will be both a

9-pin joystick interface and a 25-pin RS-232 serial port.

Like all good Boy Scouts, BOB has a compass. But this compass is a precise electronic one that allows him to figure out positions and headings. And you'd better stand clear while BOB gets his bearings. I've been told that when booting up under certain conditions, BOB spins like a whirling dervish to calibrate the compass.

The biggest disappointment, perhaps, is that BOB doesn't have an arm in the conventional sense. In fact, he has no gripper device at all. Instead, Androbot has supplied a simple lifting device that operates in the y axis (up-down) only.

This lifting device consists of a small servo-motor that turns a long, threaded rod on which the lifting unit—a U-shaped piece of metal that juts out horizontally—has been placed. The device operates much like those simple screw-type car jacks that have to be turned by hand in order to lift or lower a car. Turn the screw one way and the U bracket will lower; turn it the other way and the bracket will rise, lifting anything that fits snugly in the U.

The reason for not including an arm-plus-gripper on a mobile robot is fairly sound. It boils down to how complex you want to make your software and how many breakdowns (nervous or otherwise) you can take before you get anywhere near to making the arm work well under a wide range of operating conditions.

According to Androbot, BOB's lifting bracket can be used to lift specially designed trays or tables that are placed strategically around a room or house. The idea is that you place items of interest on these trays and, after informing BOB of how to identify these items, he will go off and retrieve them whenever you tap in the correct code on the telephone pad.

BOB currently identifies individual trays by means of a bar-coding system developed by Androbot. Like the lines that tell your local supermarket laser scanner



BOB/XA

Androbot

101 E. Daggett Dr.
San Jose, CA 95134
(408) 262-8676

List Price: \$2495, basic configuration;
\$3995, standard configuration.

Requires: 128K RAM, one disk drive.

CIRCLE 747 ON READER SERVICE CARD

what each item costs, Androbot's bar-coding system uses reflective material to enable BOB, via his optical scanner, to determine whether the correct object is in view. The bar code consists of six digits: one start bit, four data bits, and one stop bit. You can save BOB considerable search time by telling him that an object is located in a different room; the key, though, is to find a way to encode this information in bar-code form and place it on the wall in a prominent place.

BOB can recognize a 2-by-2-inch bar code up to 10 feet away. However, most households have a wide range of items that might produce visual "noise" and interfere with the scanner. I couldn't test how BOB might react to such situations in Androbot's bare-walled San Jose office, but relevant data should be forthcoming when the robot goes on the market.

Sleeping on the Job

I also foresaw some real problems in trying to get BOB to go between rooms that have carpets of differing pile thickness or between split-level floors. In the event that BOB cannot continue because of some physical barrier, he will automatically stop what he's doing after a few attempts and go to sleep. The situation is similar to DOS telling you that, having failed to read a disk track after three attempts, it wants to know if it should "Abort, Retry, Ignore?"—except that BOB seems to be programmed to abort.

Androbot has decided to use the FORTH language to program much of BOB's activity. This is interesting because, technically speaking, FORTH is an ideal language for creating extremely concise code for controlling many types of electromechanical operations.

In fact, this code is so efficient that it is not unusual to find tiny FORTH programs handling data acquisition/hardware control at major radio telescope observatories or unattended radio transmitters. Typi-

cally, the FORTH compiler and associated development software only require about 6K in a stripped-down form, while the final FORTH programs could happily live in a handful of kilobytes.

The drawbacks of FORTH center on the ease with which bizarre programs can be created. Because this language is based on a main dictionary in which "defined" words are stored for execution in programs, the programmer creates his own language. Only a few FORTH primitives

When booting up under certain conditions, BOB spins like a whirling dervish to calibrate the compass.

come ready-defined. One user-defined word may thus include the definitions of many other words already stored in the dictionary. Executing a single word may therefore have a small effect (if that word only represents a one-level definition) or a domino effect (if it represents hundreds of other FORTH words).

This makes FORTH programs some of the most personalized code ever. The source code is usually unintelligible to anyone not involved in the development process, and documenting the code later may be an impossible task for the careless programmer. However, Androbot is said to be developing a high-level program-

mer/user interface that will sit above the FORTH routines. Androbot is hoping that people well versed in the PC's architecture will see BOB as a good way to get into some exciting development work.

Many things could be done to enhance BOB's hardware and software. A bolt-on arm could be added complete with a gripper and the software to control it. Perhaps instead of having to tap in commands on the integral telephone keypad, some kind of remote-control command system could be employed (radio signals or, possibly, spoken words), and maybe decision-making software could be introduced that would elevate BOB from a quite good "follower-of-instructions" to an active "learner-of-new-rules."

A New Market?

In the late sixties and early seventies, there was a gripper-equipped robot called Freddy. He used a camera for an eye and was bolted to the ceiling. His sphere of influence consisted of a movable table supporting some wooden toys. Over time, Freddy was taught how to disassemble and assemble these toys and was able to recognize objects and interact with them by moving the table around to bring things into reach.

One-armed industrial robots have, since Freddy's time, come into widespread use. Intelligent robot design, in contrast, hasn't advanced significantly in recent years. BOB may well be in the vanguard of an emerging personal robot market. The concept of the average person owning a personal robot, however, has yet to gain popular acceptance.

If only a personal robot, or any robot, could do something really intelligent like prepare and serve an extra dry Martini without breaking the glass, cook a burger medium-rare and go easy on the mayo, or amuse you and your friends with a juggling act. When that happens, I'm sure no one could imagine being without one. ■

"I just found the
ideal solution to
my telecomputing
problems. And it's
right here inside my
IBM® PC. *Plus* I got a
free bonus to boot!"



Hayes Smartmodem 1200B™ and Smartcom II™ software.

The complete, easy-to-use plug-in telecomputing system for the IBM® PC and compatibles.

Looking for just the right telecomputing system for your PC? Hayes has it! Smartmodem 1200B and Smartcom II communications software. The most reliable and easy to use modem and software for your IBM PC or compatible computer. At a great single-package value for you. And when you buy now, you'll also receive a valuable free offer. From Hayes, the telecomputing leader.

Smartmodem 1200B. Your PC's telephone.

Everything you need to communicate—computer to computer—is on one, convenient plug-in board. Smartmodem 1200B easily slides into an expansion slot of your PC (your dealer can install it in minutes). You're ready to send and receive information at up to 1200 bps. For speedy, economical transmission to personal computers, data bases and information services throughout North America.

So what could make communications easier? Smartcom II software, designed by Hayes specifically for Smartmodem and your PC!

Smartcom II. Your Smartmodem's software.

Smartcom II maximizes the outstanding capabilities of Smartmodem 1200B. At the same time, it minimizes your effort.

Thanks to Smartcom II's menu-driven ease, the first time out you'll be creating messages, sending and storing them to disk. Simultaneously! And when you're on the receiving end, your PC will do all the work, completely unattended.

Smartcom II stores frequently called numbers and parameters for lengthy log-on sequences. So calling another system requires just a few quick key-strokes. And if you ever need it, on-line "help" is right there at your fingertips.

A complete, plug-in telecomputing system for 9 popular PC models!

Whatever your PC model, Hayes has the definitive connection! Smartmodem 1200B and Smartcom II are compatible with the: IBM PC, PC XT and PC Portable, COMPAQ and COMPAQ Plus, Corona, Televideo Portable, Columbia VIP and Direct IPC 1000.*

Free introductory subscriptions. Free access time.

Smartcom II comes with more "built-in" benefits, as well. Your Hayes telecomputing system includes introductory subscriptions and access time to several leading information services!

Sample a wide variety of practical services from CompuServe®: OAG EE® (Official Airline Guide), Dow Jones News/Retrieval®, and THE SOURCE™ AMERICA'S INFORMATION UTILITY.™ A value of up to \$200. free!

Act now through August 31! Get an additional \$69 value free.

Act right away, and you'll receive a free introductory subscription to CompuServe's Executive Information Service. For accurate, up-to-the-minute investment information, as well as news, home shopping, travel, education services and more! Direct from CompuServe to your PC screen!

And we'll also send you a complimentary copy of *Free Software for the IBM PC*, a practical resource book that tells you how to access and download more than 600 varied software programs to your PC, with the help of your Hayes Smartmodem. And Hayes offers you this valuable guide free, when you purchase a Smartmodem 1200B/Smartcom II telecomputing package!

But remember. To take advantage of these great bonuses, you need to get moving fast!

Get on-line with the telecomputing leader.

See your computer dealer right away! And plug in to the exciting world of telecomputing. With Smartmodem 1200B and Smartcom II. A smart buy for your IBM PC or PC compatible!

Hayes



Save this coupon! It's your ticket
to a \$69 value from Hayes.
Offer good through August 31, 1984.

To receive your free introductory subscription to CompuServe's Executive Information Service, and your complimentary copy of *Free Software for the IBM PC*. Complete this coupon and mail direct to Hayes with your Product Registration Card (inside your Smartmodem 1200B and Smartcom II package).

Name		
Address		
City	State	Zip
Date of Purchase	Place of Purchase	

Mail to: Hayes Microcomputer Products, Inc., Dept. 1200B,
5923 Peachtree Industrial Blvd., Norcross, Georgia 30092.

PCM

Smartmodem 1200B and Smartcom II are trademarks of Hayes Microcomputer Products, Inc.
IBM is a registered trademark of International Business Machines Corp.

*Trademarks of COMPAQ Computer Corporation: Corona Data Systems, Televideo Systems, Inc., Columbia Data Products, Inc., and Direct, Inc.

CompuServe: Information Service is a registered trademark of CompuServe, Inc., an H&R Block Company.

Dow Jones News/Retrieval is a registered trademark of Dow Jones & Company, Inc.

OAG EE is a registered trademark of the Official Airline Guides, Inc.
THE SOURCE, AMERICA'S INFORMATION UTILITY is a service mark of Source Telecomputing Corporation, a subsidiary of The Reader's Digest Association, Inc.

©1984 Hayes Microcomputer Products, Inc.

COVER STORY • JOHN GOODLET

THE PC INTERFACES WITH A HERO

Micromation's HERO MemCom board connects the PC with the Heath HERO personal robot, expands the memory, and may give PC users a way to easily program the mobile machine.





HERO

About 2 years ago, a small, somewhat unprepossessing robot made its debut in the electronics industry and set off an enthusiastic response that has yet to die down. The Heath Company of Benton Harbor, Michigan, has sold more than 8,000 models of its HERO-1 robot, a programmable automaton that was one of the first mass-produced "personal robots" to hit the market.

HERO is aimed at schools and industry for use as a training robot. It is expandable, comes either as a kit (for those who want to learn robot assembly) or preassembled, and is relatively inexpensive (\$1199.85 for the kit and \$2199.95 assembled). HERO has become popular among educators, industrialists, and hobbyists who want to learn more about and experiment with this new and exciting field.

The robot does have a few drawbacks. It lacks sufficient memory for more elaborate tasks and would benefit from an easier method of uploading and downloading programs. Hooking HERO up to a microcomputer such as the IBM PC could solve both of these problems. Many PC users would doubtless welcome the opportunity to take advantage of this new robotics technology.

A Maryland-based company, Micro-mation, Inc., has just come out with an adapter board that supplies an RS-232 interface and an additional 30K of memory for HERO. While the new hardware doesn't entirely clear the path for full exploitation of a HERO-PC interface, HERO owners should be able to use it to

greatly expand this useful little robot's capabilities.

Before any discussion of the new adapter board, a full explanation of HERO's construction and capabilities is in order.

HERO-1

The Heath HERO-1 robot is a battery-powered, versatile robot that uses the Motorola 6808 8-bit microprocessor as its brain. It has eight independently controlled axes of motion through which it can be programmed to move over limited ranges, much as industrial-quality robots do. It can drive itself around the floor on a tricycle wheel system, turn its head, rotate and extend its single arm, pivot and rotate its wrist, and finally open and close its two-fingered gripper. It will also speak using a voice synthesizer or communicate using a 6-character LED display that can flash a series of individual words to form a sentence. It can detect different levels of sound or light energy, sense motion using a continuous wave ultrasonic beam, and even measure distance using a separate, pulsed beam of ultrasound. What's more, all of these features can be sequentially programmed to form combinations of actions that are limited only by the robot's memory and the programmer's skill and imagination.

If programming is not to your taste, HERO-1 comes with a remote, hand-held teaching pendant or switch box that you can use to drive each axis through a sequence of motions and command the robot to remember the sequence and magnitude of each action.

The HERO-1 robot weighs just under 40 pounds including its accessories and stands 18 inches off the ground. It is shaped somewhat like a truncated, four-sided pyramid when its plastic side and top covers are in place. The assembled robot can be divided into three basic regions: the base or chassis, the torso, and the head.

The Base

The base assembly is supported by a tricyclelike wheel system composed of a front wheel that both drives and steers and two freely rolling rear wheels. A base plate, mounted just above the wheels, contains two motors that drive and steer the robot and one that rotates the head. Three of the four batteries that power the robot are located here. The robot has two sepa-

The HERO-1 robot is able to detect different levels of sound or light energy and sense motion using a continuous wave ultrasonic beam.

rate battery power systems, one for the electronic logic circuits and microprocessor and one for driving the motors. One logic battery is in the head, and the other is in the base. A connector block at the rear of the base contains the receptacle for an umbilical cable for charging the batteries, the teaching pendant receptacle, and two cassette tape recorder connections. The power switch is also located on this cluster of components.

The Torso

The torso is essentially a boxlike sheet-metal structure with a single door that opens to the rear. Seven of the robot's 15



HERO-1

Heath Company
Benton Harbor, MI 49022
(616) 982-3411

List Price: \$1199.85 for the kit,
\$2199.95 assembled.

CIRCLE 743 ON READER SERVICE CARD

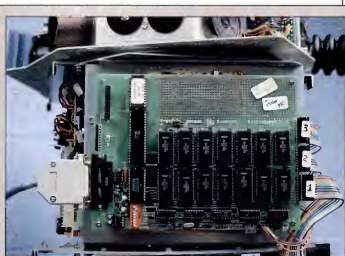
circuit cards are mounted on the outside of the walls and door; an eighth card containing the 6808 microprocessor is mounted on the inside of the wall on which the input/output card is attached. Multiwire ribbon cable and connectors connect the cards with one another. Four side covers of metal-like blue-gray rigid plastic hide all the circuit cards.

The Head Assembly

The robot's rotating head contains its single arm, wrist, and gripper assembly, a hexadecimal keypad, six 7-segment LED displays, an experimental breadboarding area for hooking external circuits to the input/output ports of the system, and a number of sensors. The sensors, which can only be seen with the head cover removed, include a pair of pulsed ultrasound or SONAR ranging transducers that lie just below the keypad (one for transmitting and one for echo reception). Just to the right of the keyboard is a transducer grouping that includes a pair of continuous wave ultrasonic motion-detection transducers (again, one to generate the outgoing signal and one to receive the echo), a light sensor sandwiched between the two motion detectors, a small loudspeaker that actually acts as a microphone is located toward the arm end of the breadboarding area, and finally, a speaker to reproduce the synthesized voice output at the other end of the breadboard. One of the two batteries needed for the logic circuits is also mounted on the head, as is the sonar receiver's printed circuit board.

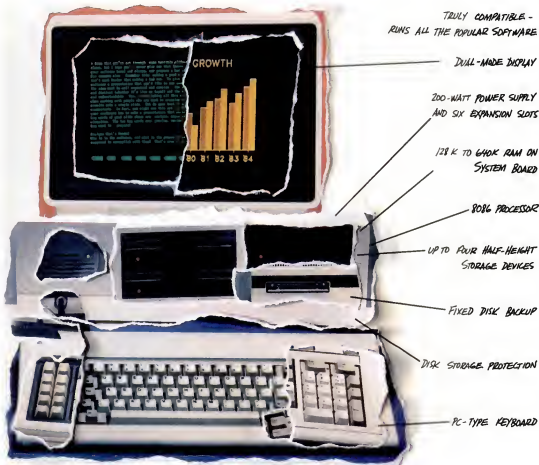
HERO's Brain

At the core of the HERO robot lies its brain, the Motorola 6808 microprocessor. This microprocessor has an 8-bit data bus and a 16-bit internal address bus that allows it to address 65,536 unique locations in memory (64K). It has two accumulators, 72 instructions, and six addressing modes (Inherent, Immediate, Direct,



Above: Micromation's HERO MemCom board. The board includes an RS-232 serial port, an on-board 2K EPROM, and 28K of additional RAM. Bolted to HERO's rear door, the board links the robot's functions to the PC, fully opening up the 64K of HERO's Motorola 6808 "brain." The board has two 8-bit bidirectional parallel ports for running peripherals. Left: HERO-1 has both a readily accessible hexadecimal keypad and an LED display for easy programming.

Computer dreams.



Introducing the new COMPAQ DESKPRO™. COMPAQ combined the best features of the best desktop computers. And then added exclusives you won't find on others. Today they're together in one personal computer: The COMPAQ DESKPRO.

The COMPAQ DESKPRO is the most expandable desktop you can buy. It can grow as you grow, with up to six available expansion slots and four storage devices, including a unique fixed disk drive backup—all *inside* the computer instead of out, saving your desk from clutter.

It's the most rugged desktop, too, because it's the only desktop with a shock-mounted mass storage compartment to help keep disk drives in alignment and help protect you from losing data, downtime, and dollars.

It's also the most compatible desktop, giving you true hardware and software compatibility with the industry's most popular personal computers. The COMPAQ DESKPRO runs thousands of programs written for the IBM® PC and XT right off the shelf. Which brings us to the next point.

Dream computer.

The industry leader in compatibility

Text and graphics on one screen, not two.

Power and space for almost unlimited expansion.

Add up to 640K of memory on system board and save expansion slots.

Runs software 2X to 3X faster.

*10MB fixed disk drive
10MB fixed disk backup
Two diskette drives*

Exclusive tape backup helps protect data.

Unique shock mounting helps protect your data and hardware investment.

Familiar layout enhanced with LED's on caps and num-lock keys.

The COMPAQ DESKPRO is the fastest truly compatible desktop you can buy. It's two to three times faster than the industry standard. That saves time now. And in the future, as software becomes more sophisticated and integrated, it will save you even more time as well as protect your personal computer investment.

But there's more. We gave the COMPAQ DESKPRO one other feature not found on any other machine. You can choose between an amber or green dual-mode monitor that displays high-resolution text and graphics with equal

brilliance, saving you the cost and clutter of a second monitor.

See the Dream Computer. Then pinch yourself. It's for real. For the location of the nearest Authorized COMPAQ Computer Dealer, or for a free brochure, call 1-800-231-0900, Operator 5 or Telex #795437 COMPAQCOMP HOU.

The New
COMPAQ
DESKPRO™

It simply works better.

Everything you

SOFTWARE

Alpha Software	
Apple-IBM Connection	call
ApTec (for color Prism Printers)	
Rainbow Writer Color Text Formatter \$119.	
Rainbow Writer Screen Grabber	69.
Ashton Tate	
dBase II	289.
dBase III	375.
Upgrade (dBase II to dBase III)	call
Framework	375.
Friday!	189.
Reference Encyclopedia (book)	55.
Best Programs	
PC/Personal Finance Program	65.
PC/Professional Finance Program II	189.
PC/Fixed Asset System	297.
PC/Tax Cut	175.
Bible Research	
THE WORD (KJV Bible - 7 disks)	145.
Broderbund	
Bank Street Writer	59.
Bruce & James	
WordVision	39.
Continental	
Home Accountant Plus	89.
Home Accountant Plus & Tax Advantage w/\$20 manufacturers rebate coupon	128.
Digital Research	
CP/M-86	69.
DR LOGO (requires 192K & RGB monitor)	39.
Financier	
Financier II (was Personal Series)	115.
Financier Tax Series	97.
Funk Software	
Sideways	45.
Hayes	
SmartCom II	99.
LifeFree	
VolsWriter	115.
VolsWriter International	135.
VolsWriter Deluxe (with TextMerge)	175.
Living Videotext	
ThinkTank	139.
Lotus Development	
1-2-3 (version 1A)	call
Symphony	call
Upgrade (1-2-3 to Symphony)	call
Micropro	
WordStar & ProPak come with quick lesson CAI training disk and tutorial disk	
WordStar 3.3	235.
ProPak (WordStar/MailMerge/	
MicroStar/StarIndex)	359.
Microsim	
R-base 4000	319.

PC Connection Software Special

through August 31, 1984

We're so confident you'll be pleased with these programs, that we're offering to buy them back if you return them within 30 days.

PC software

Championship Blackjack

- Realistic casino action
- Works on monochrome display or in full color on TV/RGB
- Up to 6 players (including your PC)
- Can be used for fun or to learn point count statistics

\$19.

CREATABASE

One of the few databases chosen by PC Magazine's "Project Database Review" (June 12, 1984) as "Would Buy". Quoted as, "...should be the first file management system a PC owner buys." You can design your own screen and report layouts

\$39.

Extended Report Writer	\$89.
Clout	129.

Micro Data Base

Knowledge Man (requires 192K)	275.
-------------------------------------	------

Microsoft

Multipan (ver 1.2)	139.
Multi-Tool Financial (for Multipan)	69.
Multi-Tool Budget (for Multipan)	99.
Microsoft Word (ver 1.1)	239.
Microsoft Word with mouse (ver. 1.1)	289.

Microsoft

Crosstalk XVI	105.
Infoscope	149.
Transporter (includes Crosstalk)	169.

PC software

PCrayon (creates in full color)	34.
Executive Picture Show	139.

CREATABASE

see special

Peter Norton

Norton Utilities	55.
------------------------	-----

Rosssoft

Prokey 3.0	89.
------------------	-----

Satellite Software

WordPerfect	call
-------------------	------

Software Arts

TKISolver	269.
-----------------	------

Financial Management Pack

Mechanical Engineering Pack

Software Products

Open Access	389.
-------------------	------

Software Publishing

PFS/Access	63.
PFS/File	89.
PFS/Graph	89.

PFS/Write	\$89.
PFS/Report	79.

Software Systems

Multimate (ver. 3.22 w/spell checker & tutorial)	call
--	------

Sorcim

Supercalc 2	149.
-------------------	------

Supercalc 3	199.
-------------------	------

Virtual Combos

Micro Cookbook	29.
----------------------	-----

Soups & Salads (add on disk)	15.
------------------------------------	-----

VisiCorp

VisiCalc IV (w/StretchCalc)	159.
-----------------------------------	------

VisiFile	99.
----------------	-----

VisiSchedule	129.
--------------------	------

VisiTrend/Plot	69.
----------------------	-----

VisiWord Plus (with VisiSpell)	129.
--------------------------------------	------

StretchCalc (for VisiCalc)	75.
----------------------------------	-----

Warner Software

The Desk Organizer w/1 yr.free updates	197.
--	------

TRAINING

ATI

How to use Lotus 1-2-3	55.
------------------------------	-----

How to use Wordstar (vol 1 & 2)	55.
---------------------------------------	-----

How to use dBase II (vol 1 & 2)	55.
---------------------------------------	-----

How to use EasyWriter II	55.
--------------------------------	-----

How to use Multiplan	55.
----------------------------	-----

How to use Your IBM-PC	55.
------------------------------	-----

How to use MultiMate	55.
----------------------------	-----

How to use Microsoft Word	55.
---------------------------------	-----

How to use PC DOS	55.
-------------------------	-----

How to use TKI Solver	55.
-----------------------------	-----

Individual Software

The Instructor	35.
----------------------	-----

Professor DOS	47.
---------------------	-----

Tutorial Set (both items above)	75.
---------------------------------------	-----

Professor Pixel	47.
-----------------------	-----

Typing Instructor	39.
-------------------------	-----

Lightning Software

Master Type	35.
-------------------	-----

EDUCATIONAL

Davidson

Speed Reader II (high school & college)	49.
---	-----

Math Blaster (grades 1-6)	35.
---------------------------------	-----

Word Attack (grades 4-12)	35.
---------------------------------	-----

Additional Data Disks for other ages are available for Speed Reader II and Word Attack at \$15. each

FriendlySoft

FriendlyWare/PC Introductory Set	35.
--	-----

Knoware

Knoware (requires graphics board)	67.
---	-----

* DEFECTIVE SOFTWARE REPLACED IMMEDIATELY. DEFECTIVE HARDWARE REPLACED OR REPAIRED AT OUR DISCRETION. SOME ITEMS HAVE WARRANTIES UP TO FIVE YEARS.
* COPYRIGHT MICRO CONNECTION, INC. 1984. ALL ITEMS SUBJECT TO AVAILABILITY. PRICES SUBJECT TO CHANGE WITHOUT NOTICE. IBM IS A REGISTERED TRADEMARK OF IBM CORP. ®. CONNECTION AND MICRO CONNECTION ARE TRADEMARKS OF MICRO CONNECTION, INC. PC CONNECTION IS A REGISTERED TRADEMARK.

PC CONNECTION®



PC Poolside

Over the river and through the woods.

By now it's obvious. PC Connection is the world's most personal purveyor of PC peripherals and programs, at very pleasant prices. Paws down.

But what many PC users don't know is that our sprawling multi-story (two, to be exact) corporate headquarters is located on the banks of the Ashuelot in rustic Marlow, NH (pop. 542).

On that very river, in millennia-old glacial pools, you may chance upon some of our employees, and the occasional small furry animal, cooling off after another hot day on the phone.

PC hardware, software, and leisure wear.

Our trained PC specialists are dedicated to helping you bring your PC to its pinnacle of performance.

Every day, rain or shine, we open the flood gates and ship wave upon wave of PC products downstream to every state in the country, and many of the countries in the world.

Disk drives, video boards, multi-function cards, modems, mice, amenities, and the best software programs in every category, from games to business.

Just give us a call or visit our showroom. We can put an end to any PC predicament. We're fast, reliable, and offer prices as low or lower than anyone else's.

And we can even help you make a splash in the up-and-coming world of microcomputer fashion.

Keep your shirts on.

Better yet, keep our shirts on. Stylish polo shirts designed exclusively for PC Connection by Oscar de la Roca. Available in unisex sizes. Free to anyone who places a \$500.00 order with us between now and September 30.

Just call 1-800/243-8088 or 1-603/446-3383 anytime Monday through Friday 9:00 to 9:00 and Saturday to 5:30. If you're planning to visit us, call ahead to make sure what you want is in stock.



Polo shirts from PC Connection. Limit one per customer. Offer not available to commercial accounts. Please specify XS, S, M, L, or XL.

For the IBM-PC exclusively.

PC CONNECTION

ad up, and dive in.

PC Pedestal (for IBM Mono or Color) \$55.
PGS or Quadchrome display adapter... 9.
System Stand (holds PC vertically)... 21
Extension Cables for IBM Mono Display 40.
Keyboard Extension Cable (3 to 9 feet) 32
AC Plug Adapter (any monitor to your PC) 8.

Electronic Protection Devices

All are rated at 1875 watts, 15 AMP.

The Lemon... 39.
The Lime... 59
The Peach... 64.
The Orange... 94

Epson

RX-80 with GRAFTRAX-Plus... call
RX-80 F/T with GRAFTRAX-Plus... call
FX-80 with GRAFTRAX-Plus... call
RX-100 with GRAFTRAX-Plus... call
FX-100 with GRAFTRAX-Plus... call
LQ 1500 (letter quality dot matrix)... call
Printer to IBM Cable (specify printer)... 32

FTG Data

Light Pen (Push Tip)... 159
Demo Disk Set for Light Pen... 39

Hayes

Smartmodem 300... 209
Smartmodem 1200... 489
Smartmodem 1200B (w/Smartcom II)... 409
Smartcom II... 99
Compucable's Smartmodem-to-IBM Cable... 259

Hercules Computer

Hercules Graphics Card (parallel port) 39.
Hercules Color Card (parallel port)... 179
Graph-X Software... 42.

IDS

Prism 80 Printer (with all four options) 1397
Prism 132 Printer (with all four options) 1597
Prism to IBM Parallel Cable... 32

key tronic

Typewriter style keyboard (KB 5150) call
Deluxe keyboard (KB 5151)... see special

Koala

Koala Touch Tablet with software
(connects to game port)... 89

Kraft

Joystick... 39
Game Paddles (pair)... 29

Maynard Electronics

Floppy Drive Controller... 165
Internal Hard Disk (10 Meg), WS-1 Controller & ROM for PC mother board... 989.
Internal Hard Disk (10 Meg), WS-2 Controller & ROM for PC mother board... 1169

Mouse Systems

PC Mouse (w/software & desk pad) 197.
NEC

Sprinwriter 3550 (IBM-PC compatible) 1679
Sprinwriter 2050 (3550's little brother) 869

Novation

Access 1-2-3 (includes Crosstalk XVI) 379.

Orchid Technologies

All Orchid Boards come with PCnet Drive (Ram disk), PCnet spool (print spooling), disk caching & partitioning

Blossom 0k or Blossom 64k upgradeable to 384k, with clock calender, serial and parallel ports... call

PCnet Daughter Board (piggybacks to Blossom) with version 2.4 networking software... call

PCnet Blossom 64k Blossom Board with the Daughter Board installed... call
Diskless Boot Rom, Cluster Kit, etc avail... call

Paradise Systems

MultiDisplay Card (color & mono)... \$379.
Plantronics/Frederick
COLORPLUS (now w/Color Magic)... call

Princeton Graphics

HX-12 RGB monitor (690 x 240)... call
SR-12 RGB monitor (690 x 480)... call
MAX-12 Amber monochrome monitor... call

Quadram

We are a full line Quadram Dealer

New Expanded Quadboard 64k expandable to 384k, with clock calender, parallel, serial & game port, I/O bracket, and Quadmaster software... 269

Microfacer Printer Buffer (parallel) w/copy MP 64 (64k) upgradeable to 512k... 197

Quadcolor I... 197

Quadchrome RGB Monitor... 497

Quadlink (allows you to run most Apple II programs directly on your IBM-PC or XT)... 459.

Quadisk (various sizes to 72 meg)... call

STB

Graphix Plus (color & monochrome) 279

Silver Reed (letter quality, 132 column)

Silver Reed EXP 550 Printer (16 CPS) 589

Silver Reed EXP 770 Printer (30 CPS) 950

TG

Joystick... 45.

USI (monitors for graphics board)

Pi-2 Monitor (12" green, with cable) 119.

Pi-3 Monitor (12" amber, with cable) 129

DRIVES

All drives are completely pre-tested. Specify Drive A or Drive B for your PC. Comes with complete step by step installation instructions. Drives are 320K/360K.

Tandon

TM 100-2 (5 1/4") full-height drive (DS,DD) \$229.

TEAC

FD-55B (5 1/4") half-height drive (DS,DD). Free 'y' cable & bracket with each pair 179.

MEMORY

64k Memory Upgrade Set for IBM-PC or XT system board... 59.

64k Memory Upgrade Set for any memory board specify make of board... 59.

Install memory upgrades & run diagnostics at time of board purchase only... 10.

DISKS

Verbatim (with 5 year guarantee)

Dataflex Disks SS/DD plastic box of 10 25.

Dataflex Disks DS/DD plastic box of 10 35

Disk Drive Analyzer... 25.

Flip Sort (holds 75 disks)... 19.

INFORMATION SERVICES

Compuserve

Compuserve Information Service includes subscription, manual, 5 hours of connect time, & monthly publications) 29.

Executive Information Service... 79.

Vidtex Software... 59.

Executive Information Service with Vidtex... 119.

Source Telecomputing

The Source (subscription & manual)... 59

The Source with Sourcelink Software 89

jr connection's on line.

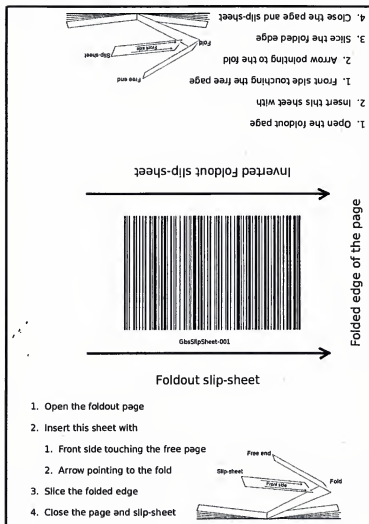
Our new division, Jr. CONNECTION, is ready to serve you with the same kind of excellent products, prices, and support you've come to expect from PC CONNECTION. When you call Jr. CONNECTION, you'll talk to one of our trained PCjr. consultants. They've been working with junior for months. They know what

add-ons you'll need for your application, and what software will run on your system. They can clear up any questions you have about junior, and get you up and computing in a flash. For your PC and XT, keep calling PC CONNECTION. For your PCjr., call Jr. CONNECTION — exclusively for the IBM-PCjr.

1-800/IBM-jr PC

CIRCLE 339 ON READER SERVICE CARD

PC CONNECTION®



1. Follow instructions on the other side

Inverted Back



Gbs5ipBack-0016

Back

1. Follow instructions on the other side

need to add on, lose

Spinaker (All require graphics board) Educational Games for Young Computer Users

When you send 4 or 5 proofs-of-purchase to Spinaker, they will send you the game of your choice FREE.

Delta Drawing (ages 4 to adult)	\$34
Snooper Troops I (ages 10 to adult)	30
Snooper Troops II (ages 10 to adult)	30
Most Amazing Thing (ages 10 to adult)	27
Face Maker (ages 3 to 8)	23
Kids on Keys (ages 3 to 9)	23
Story Machine (ages 3 to 9)	23
Fracton Fever (ages 7 to adult)	23
Kindler Comp (ages 3 to 8)	20
Rhymes and Riddles (ages 5 to 9)	20
Hey Diddle Diddle (ages 3 to 10)	20
Alphabet Zoo (ages 3 to 8)	20
Stone (requires graphics board)	
Greet graphics and sound	
My Letters, Numbers, & Words	
(ages 1 to 5)	29
Kids Stuff (ages 3 to 8)	29
Across the U.S.A. (ages 5 & up)	22

GAMES

AtariSoft	
Centipede	29
Pac Man	29
Dig Dug	29
Defender	29
Donkey Kong	29
EPYX/Automated Simulations	
Temple of Apshe	27
Upper Reaches of Apshe	15
Curse of Ra	15
Star Warrior	27
Rescue at Rigel	23
Crush, Crumble, and Chomp	23
Blue Chip	
Millionaire	45
Blue Giant	
Hoser	25
FriendlySoft	
FriendlyWare/PC Arcade	35
Funkastic	
Sneak Attack II (e favorite)	27
Cosmic Crusader (as good as above)	27
Big Top (climb to new levels)	29
Master Miner (1 or 2 players)	29
Hayden Software	
Sargon III	35
Infocom High quality text games	
Zork I, Zork II, Zork III each	27
Starcross	35
Deadline	35
Suspended	35
Witness	35
Planetfall	35
Enchanter	35
Infidel	35
Sorcerer	35

PC Connection Hardware Special through August 31, 1984

key tronic

Deluxe 5151 keyboard

- Typewriter style keyboard
- Has separate cursor and numeric keypad (makes work with spreadsheets much easier)
- Has indicators on numlock, capslock, and cursor pad LED key.
- Function keys are located at top of keyboard along with 2 new keys (pause and reset) \$175.

OUR POLICY

- We accept VISA and MASTERCARD
- No surcharge added for charge cards
- Your card is not charged until we ship
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order
- No sales tax.
- All shipments insured; no additional charge.
- Allow 1 week for personal & company checks to clear.
- CDO max \$500 Cash or certified check.
- 120 day guarantee on all products.*
- To order, call us anytime Monday thru Friday 9:00 to 9:00, or Saturday 9:00 to 5:30. You can call our business offices at 603/446-3383 Monday thru Friday 9:00 to 5:30.

SHIPPING

Continental US: For monitors, printers, and drives, add 2% to all orders. For all other items, add \$2 per order for UPS surface. \$3 per order for UPS 2nd-Day-Air. We particularly recommend 2nd-Day-Air if you live west of the Mississippi or south of Virginia. In most cases it will only cost \$1 more and will save you up to four days on delivery time. **Outside Continental US:** We add freight charges to credit card purchases. For prepayment, call 603/446-3383 for information.

1-800/243-8088

PC Connection 280M
6 Mill St., Marlow, NH 03456
603/446-3383

For the IBM-PC Exclusively.

Microsoft

Flight Simulator (new version) \$35

Orion

J-Bird (you'll never sleep) 29.
PC-MAN 27.
Paratrooper 25.
Pits & Stones 29.

PCSoftware (mono or color board)

Armchair Quarterback 27.
Chess 2001 27.
Championship Blackjack see special

Sir-Tech

Wizardry 42.

Sierra-On-Line

Frogger 27.
Crossfire (keyboard or joystick) 23.
Ulysses and the Golden Fleece 27.

Strategic Simulations

The Warp Factor 27.
Tigers in the Snow 27.
Galactic Gladiator 25.

Epidemic

Sublogic 29.

Night Mission Pinball 29.

Zee Programming

Zuran Defender 25.

HARDWARE

AST Research (For IBM-PC or XT)

All AST Boards come with SuperDrive, SuperSpool, and one year warranty.
SixPakPlus 64k upgradeable to 384k, with clock calendar, serial and parallel ports (game port optional) 269.
MegaPlus II 64k upgradeable to 256k (or more with MegaPak) with clock calendar and serial port (parallel, game, or second serial port optional) 269.
MegaPak 128k (not upgradeable) call
MegaPak 256k call
IO Plus II with clock calendar and serial port (parallel, game, or second serial port optional) 129.
Parallel, Game, or second Serial Port for any AST board (specify board) 39.
Connectell connector bracket (PC only) 19.
AST-5251 558.
AST-3780 649.
MonographPlus with clock calendar, serial & parallel ports 429

Amdak

Video 300G Monitor (green) 149.
Video 300A Monitor (amber) 159.
Video 310A Monitor (amber) 179.
Color II RGB Monitor 399.
MAI Board (color & monochrome) 399

CompuCable

Plastic Keyboard & Drive Cover Set 17.
IBM Mono Screen Enhancement 17.
Printer to IBM Cable (specify printer) 32.
Smartmodem to IBM Cable 25.

Curtis

Low Profile Tilt & Swivel Pedestal (for any monitor) 44.

PC CONNECTION®

HERO

Extended, Index, and Relative), for a grand total of 197 unique assembly or machine language instructions that include arithmetic, logic, branch, jump, interrupt, and stack and index register types. An 8-bit processor could have as many as 256 unique instructions, but few do. Consequently, there are 59 unimplemented opcodes (hexadecimal machine-language instructions) in the Motorola set. Supporting the 6808 is an 8K ROM and a 4K RAM system consisting of dual 2K \times 8-bit 6116 RAM chips. Of the 4K, only about 3.7K is available to the user—a serious limitation in writing long, sophisticated application programs, even in robot language. For instance, for the displays to be used as visual annunciators they must be programmed in machine language. Each routine requires a fairly large amount of memory—on the order of 50 bytes for even a simple message.

HERO's Language

Programming and activating HERO in 6808 assembly language would be tedious and time consuming were it not for the relatively simple high-level robot language that Heath has implemented in an interpreter located in the robot's on-board ROM. This 8K \times 8-bit mask-programmable ROM contains almost 7,000 machine code instructions that can be called as subroutines by the 37 robot language instructions. The robot codes have been assigned 37 of the 59 unimplemented opcode locations; this is how the interpreter can recognize them as unique.



HERO MemCom Board

Micromation, Inc.
9104 Red Branch Rd.
Columbia, MD 21045
(301) 730-1237
List Price: \$295

CIRCLE 744 ON READER SERVICE CARD

Although it is much easier to learn the robot language than to program HERO in assembly language, you can use either programming method and can even switch back and forth between the two.

use the PC to operate HERO.

Micromation's HERO MemCom (MEMory COMmunications) board may be the answer. It is a multifunction printed circuit card that bolts to the rear door of

The typewritten documentation is excellent; I installed and tested the board without a hitch in only an hour or so of careful work. But troubleshooting procedures are included should problems arise.

Sixteen robot instructions are dedicated to controlling the eight axes of motion, seven devoted to speech commands, eight to the four sensors (light, sound, ultrasonic ranging, and motion detection), two to the seven-segment LCD display operation, and four general-purpose commands. In addition, a number of machine language subroutines can be called to activate specific segments or characters in each of the six displays. This latter feature permits you to display any of the 128 segment combinations possible or to encode words or sentences (which can be flashed a word at a time). Also, a number of canned phrases and sentences can be called when appropriate.

The HERO MemCom Board

To reach its full potential, HERO needs two things: additional memory and a rapid, easy method of uploading and downloading programs and data into the robot. Since the IBM PC is well known for its proficiency in both those areas, it would be convenient if a way could be found to

HERO's torso when the plastic side covers are removed.

The board includes an RS-232 serial port with an on-board 2K supporting EPROM that allows uploading and downloading of HERO programs from a PC to HERO and 28K of additional RAM (14 2K RAM chips) which, when combined with the 3.7K HERO already has, brings the user total up to almost 32K. The board also has two 8-bit bidirectional parallel ports with handshaking lines for data transfers that can be used to drive printers or control other parallel peripherals and two 16-bit interval timers for counting and timing. For advanced interfacing projects, it has a wire-wrap prototyping area that brings out all of HERO's 6808 address, data, and control lines.

Baud rates for the board's serial port are derived from a crystal-controlled clock. You can select eight different rates using the board's DIP switches. More importantly, the MemCom serial port is configured in a Data Communications Equipment (DCE) mode that is matched to

the Data Terminal Equipment (DTE) configuration of the IBM PC's asynchronous adapter serial port. This means that the first eight sequentially numbered pins on the connectors at each end of the RS-232 cable can be connected as pin 1 to pin 1, pin 2 to pin 2, and so on without any cross-overs such as pin 2 to pin 3. (The "RS-232 serial interface standard" is sometimes not so standard.)

Installation and Documentation

The MemCom board is designed to be mounted to the rear door of HERO's torso on four standoffs that permit the board to fit nicely between the door and the plastic cover. The location is efficient because the board is electrically connected to HERO's CPU board, which is mounted to an adjacent inner sheet-metal wall of the torso. Three ribbon cables containing Molex connectors connect the MemCom board to the CPU board. Five leads at the other end of one cable must be soldered to two other HERO boards (three to the Sense board and two to the I/O board). Three Molex connectors attached to the other ends of the ribbon cables connect to the MemCom board, completing the electrical hookup. An RS-232-type DB 25 female connector resides on the board so you merely have to purchase the appropriate RS-232 cable to connect the interface to the PC. The only tools you need to install the board are a 1/8-inch drill, a soldering iron, and a small screwdriver.

The typewritten documentation supplied with the board is excellent; I installed and tested the board without a hitch in only an hour or so of careful work. The documentation has a checkoff box for each step in the installation and checkout process alongside the appropriate paragraph. Troubleshooting procedures are also included should problems arise. The instruction manual is clearly written and generously sprinkled with helpful technical information, references, drawings, tables,

EPROM source code listings, and even a program listing for an Apple II serial upload-download program.

Testing and Operation

After the board was installed and the electrical connections were made, the next step was to find out if the PC could really communicate with HERO. It could and did, but only in a relatively crude way—at least for the present.

Because HERO's 6808 microprocessor need only work with 8-bit coded data words that span the decimal numbers 000 through 255, and because this range can be represented in hexadecimal by the character pairs 00 through FF, HERO need only recognize ordered hexadecimal pairs. Since ASCII is basically a 7-bit binary code (8 bits with a parity bit) that represents 128 unique characters, it is not surprising that nonnumeric characters mean nothing to HERO. To embed a program in HERO RAM that can be interpreted as a sequence of machine code instructions (8-bit opcodes), HERO must perceive each instruction or piece of numeric data as consisting of an equivalent ordered pair of hexadecimal characters. In essence, this

means that the first 4 most significant bits of an ASCII code word can be lopped off and only the least significant 4 bits need be recognized as a hexadecimal number.

The Micromation, Inc., EPROM software is constrained to decode or encode the least significant nibble of an 8-bit ASCII character as a hexadecimal number, which it reads from or writes into a starting location in the 32K bank of HERO memory. Since the least significant 4-bit nibble of the ASCII code for the decimal numbers 0 through 15 (0 through F in hexadecimal) is also the straight binary code for these numbers, the most significant 4-bit nibble of the ASCII code (0011) can be removed and two hexadecimal numbers can be efficiently packed into a single 8-bit byte. This is essentially what is done in storing opcodes, pseudo-opcodes, or data in the MemCom format. In short, it means that a PC will need some sort of software package to both encode and decode information going to and from HERO in order to make programming the robot relatively easy and efficient. Micromation, Inc., has supplied such a program for the Apple II, but, as far as I know, one does not exist for the IBM PC.

The Micromation HERO MemCom board is a versatile piece of interfacing hardware that offers a much-needed stepping stone toward an efficient link between the IBM PC and the Heath HERO-I robot. It opens up a direct bidirectional communication channel between the PC and the HERO robot and gives you an almost a tenfold increase in available RAM so that HERO can execute large programs that can potentially be saved to disk for later use. Still needed is a good PC software package that will complete the PC-to-HERO connection. ■

To reach its potential, HERO needs two things: additional memory and an easy method of uploading and downloading data.

John Goodlet is an associate professor in the Department of Technology, School of Engineering, at the City College of New York.

A PC MIX for the MUSIC BIZ

Submitted for your consideration: Ariel and MetroGnome, two new companies whose products may transform the music business and the music it makes.

If you're inventive enough, you can find a hundred uses for a tool other than the one it was designed for. A good hammer also makes an excellent paperweight, a so-so ruler, and an interesting (if slightly dangerous) juggling prop. But it's best at being a hammer; that's its most practical application.

Computers are a little different. While they're best at being com-





puters, you'd be hard pressed to name a single "best" application—or even a dozen. People see computers doing flashy things, and then they define the tool in terms of what it's doing without thinking any further. This happened in the music business with . . . well, with music.

The music field is positively abuzz with computerized instruments and recording consoles and digital recording decks. But the business of music—from technical support and maintenance to making sure the royalty checks go out on time—is still something of a wasteland when it comes to computers. Sure, CBS Records has mainframes to handle its cash flow and contracts. But there are well over 4,000 recording studios in the country, 10,000 music publishing companies, 100,000 gigging musicians, and at least a quarter of a million people writing songs. The power of the personal computer hasn't done all that much for the folks behind those numbers—until recently.

Now new hardware and software are beginning to fill needs the music business barely knew it had. These products will have their cumulative impact on the practical side of the recording industry, the environment in which all popular music is first midwifed and then marketed.

Two such products are the RTA 331 Spectrum Analyzer from Ariel Corporation, and a series of five industry-tailored databases from MetroGnome. Let's take a look at these two ground-breaking companies and their offerings.

PC MIX

Ariel RTA 331 Spectrum Analyzer

Ariel Corporation
600 W. 116th St.
New York, NY 10027
(212) 662-7324

List Price: \$649.95 (includes hardware, software, manual, source code, and support)

Requires: Color/graphics adapter, expansion slot.

CIRCLE 797 ON READER SERVICE CARD

ARIEL'S SPECTRUM ANALYZER

Simply defined, sound is nothing more than waves of changing air pressure. The amount of pressure change in a soundwave determines its *volume*, and the rate of pressure change over a given time (known as wavelength) creates its *pitch*.

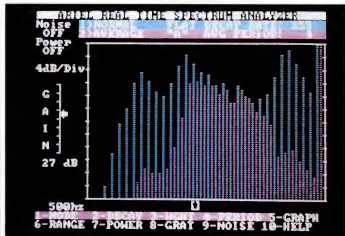
These two aspects, volume and pitch, are the things about sound that most of us are aware of on a conscious level. But there is more to sound than meets the conscious ear. Even a relatively simple synthesizer beep's tone color and pitch result from a continually changing complex of waveforms called *harmonics*. In order to "hear" these less-obvious elements of sound and to make deliberate use of that information, we have to apply a special tool called a "frequency spectrum analyzer" such as the RTA 331 from Ariel Corporation.

"RTA" stands for "real-time analysis," and what it means is that you can take your IBM PC, plug in the 331 peripheral card (with a cable-attached

box of electronic filters), run the RTA program, and completely analyze the frequency range and intensity of any sound source.

Spectrum analyzers, even real-time ones, have been around for many years, but they've been hardwired, inflexible, and expensive (like many such tools were before the days of microprocessors). The Ariel company has taken advantage of the PC by connecting hardware to it that instantly breaks down incoming sound signals into raw data and then uses the PC's processor and software to analyze and display that data in a variety of useful ways. Since the form the analysis takes is software driven, it isn't limited. You can customize it to suit your needs or even to develop entirely new applications.

Here's what you see in its most basic form. On the PC's medium-resolution screen (320 x 200 pixels) you'll find a 64-bar graph display in two colors. Each color represents a different kind of anal-



The RTA 331 from Ariel Corporation generated this frequency spectrum analysis of a synthesized rhythm section.

ysis, and both are done simultaneously. You can choose from several kinds of analysis—the telltales for your choices are the color-matched bars across the top of the screen. To the left are readouts that tell you whether or not the 331's on-board pink noise source (which provides a calibration standard for analyzing a given area's audio response) is on, what the decibel (dB) scale setting for the graph is, and what your input volume is set to. At the bottom of the screen are the system's different primary commands and the function key numbers you use to execute them.

You also see movement. Lots of movement. Imagine, for a moment, that you've plugged your radio into the standard 1/4-inch phone input jack in the 331 peripheral card. On the screen all 64 bars will be snapping up and down, in perfect time to the music, each bar representing the amount of sonic energy in that particular portion of the sonic spectrum, which the RTA 331's filters will measure all the way from very low notes (20 cycles per second) to the upper limits of healthy human hearing (around 20,000 cycles per second, although most adults can't hear much above 16,000).

Putting It to Use

All well and good. It's a great light show, and it beats a cheap sixties color organ for visual appeal. But how can you use it?

Those in the music business will find plenty of ways. At every step of the recording, record-pressing, radio-broadcasting process, sound has to be compromised and optimized to make up for limitations in electronic hardware and the laws of physics. More often than not, because of the prohibitive cost of good analyzing gear, these choices are being made by guesswork and engineering intuition. The RTA 331 presents a lower-cost way of providing vital information and throwing the guesswork out the window.

Take the simple case of a recording session where the engineer has to blend the



These products will have their cumulative impact on the recording industry, the environment in which all popular music is first midwived and then marketed.

bass guitar and the bass drum sound successfully. This is quite a challenge, because (a) they occupy much the same frequency range; (b) to fit sounds onto a record they have to be compressed, reducing timbral characteristics that keep the two sounds distinct; and (c) low notes are more omnidirectional, conveying less spatial information than midrange and higher frequencies, so that the two instruments will tend to sound like they are coming from the same place when reproduced.

The solution is to adjust the frequencies of the two recorded sounds, a trick called *equalization*, so that they "peacefully coexist." Depending on what else is happening in the music at the same time, this can be as simple as notching out a selected portion of the drum sound (creating a pocket for the bass guitar to "sit" in), or as complex as performing radical sonic surgery on both sounds. Done by ear, this can take hours of trial and error, but a quick pass through the RTA 331, with which you can actually get a picture of

what's happening with the sounds, both isolated and mixed together, could identify the appropriate approach in minutes.

That's a simple example. The RTA 331 has many practical features that widen the range of its possible applications even further. It can be set to give you an averaged response, over selected times, so that you can scan a sound for its most frequently recurring strong points.

The color bars can be set to hold at peak points or fall away from them gradually, which gives you time to think about the data you're getting. This is particularly useful when setting one 31-bar graph in color A in this mode and its side-by-side 31-bar graph in color B in the standard instant-rise-and-fall mode, giving you both forms of analysis at the same time. The screen's readout can be toggled to freeze at any time. Selected "weighting curves" for the analysis can be chosen, or even user-defined, so that patterns conforming to certain long-term industry standards for frequency analysis can be

obtained. And the frequency indicator arrow can be set, in software, to automatically flash beneath the band of the spectrum with the greatest amount of energy from moment to moment.

Sound Applications

Even if this were all the RTA 331 could do, it would be immensely valuable in all of the following applications:

- augmenting the more specific (but also more limited) readouts of an oscilloscope in audio design and testing;
- sound recognition (in its crudest form, analysis for the fun of it. You could also put one of the home-controller systems on the market in another PC slot and

write software to trigger it by patterns that the RTA 331 would detect and respond to. You could set your PC to respond to your voice and to no one else's.);

- preventing distortion while recording, mastering, and record-plating by keeping track of peak-level transients;
- room analysis and studio design for better recording, using a pink noise source and a mobile microphone input to figure out a given recording studio's sonic weak points so that they can be fixed by reconstruction or appropriate electronic equalization;
- multichannel level indicators and sound analysis (as in the bass guitar/bass drum example, but on a wider scale);

- measuring reverb characteristics;
- audio component design/testing;
- many acoustical laboratory techniques.

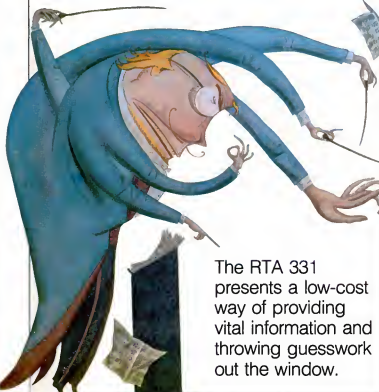
Data In, Data Out

All of the above would be plenty, but there's still more, thanks to the RTA 331's second primary program. It's called DIO, for "Data In/Out," and it allows you to turn your PC into a digital sound recorder. The actual amount of sound that can be "sampled" (as this kind of digital recording is referred to) and played back is directly dependent on how much memory you've got and what kind of playback frequency bandwidth you require. With 512K of memory, you can manage about 20 seconds of audio storage at the standard sampling rate, but it would be possible to get longer samples if you were willing to lower your sampling rate and fidelity. (If you want to figure out how many seconds of sound you could get with a given amount of memory, subtract 64 from the number of installed kilobytes and divide that figure by 20.)

DIO allows you to really dig into the waveform of a given sound or mass of sounds over time and to plot one or more sections or to compare old and new sounds on the screen simultaneously, in your choice of four colors. And since the sound is now a data file, it can be manipulated in programs to play back in any way imaginable—backwards, cut up and rearranged, or looped.

As it stands, DIO is a tool seeking a set of possible applications; it's a capability that the RTA 331 supplies but does not elaborate on.

Ariel is a small company, and it prefers to concentrate its development efforts on putting tools into people's hands, instead of delimiting the uses of those tools in advance. To that end, Ariel supplies a comprehensive manual with the RTA 331's complete assembler source code listings and invites the creativity of individual engineers and programmers, wherever they may be.



The RTA 331 presents a low-cost way of providing vital information and throwing guesswork out the window.

METROGNOME DATABASE SOFTWARE

Take Mark Augelli, a former IBM systems engineer with business interests in the Nashville studio and music publishing scene. Introduce him to Larry Keith, a songwriter and music publisher with a growing interest in computers. Stir in a mutual inspiration—that the music field was largely untouched by the wonders of computer organization and was thus an open market—and presto, you have a tidy little company called MetroGnome, dedicated to giving the industry what it needs and wants—to take care of business.

"The first package we did," says Augelli, "was *Catalog Plus*. It was designed to help music publishers, not only by keeping track of their royalties, but by seeing the business for what it is—the marketing of a product. Nobody had ever written anything that said, 'This is how you market the songs.'"

PG FACT FILE

MetroGnome, Inc.
602 W. Iris Dr.
Nashville, TN 37204
(615) 298-4948

List Price: *Catalog Plus* (comes with *Advanced DB Master*) Catalog Management System, \$1,195. Staff Management, Contact Management, and Income Management modules, \$100 each. *Sessions Plus* (comes with *Advanced DB Master*), \$1,195. *Pickers Plus*, *Writers Plus*, and *Labels Plus*, \$149 each.

Requires: *Catalog Plus* and *Sessions Plus*: 256K RAM, one disk drive (two disk drives or hard disk recommended). *Pickers Plus* and *Writers Plus*: 64K RAM, two disk drives. *Labels Plus*: 64K RAM, one disk drive.

CIRCLE 798 ON READER SERVICE CARD

```

File: SOMCONST.B1          DISPLAY          Page 1 of 2

Song Title Bigger The Love(The Harder The Fall)
Catalog Number _____

Tempo 69 _____      Time Signature 6/8 _____

      Major/Minor: Rock
      Major/Minor: Rockabilly
      Major/Minor: Pop
      Major/Minor: Country
      Major/Minor: Blues

Positive/Negative = _____      Gender M _____

Song Format W+C+C+C+C _____      Subject Concept Last Love _____

Strong Suit Lowie _____

```

This screen is from the song casting module of *Catalog Plus*, which is a template for the *Advanced DB Master* database program.

Accordingly, the database modules in *Catalog Plus* are organized to cover four sections—catalog management, staff management, income management, and contact management—in such a way that good business tends to be done automatically. For example, under Catalog Management, there are sections for master song data, song casting (that is, who you think is a good prospect to perform a number), song release, foreign catalog data, and even song pitch (not the key of the tune, but whom you've tried to sell it to, whom they represented, their reactions, and so forth).

Two of the five MetroGnome packages—*Catalog Plus* and *Session Plus*—are actually templates for StoneWare's *Advanced DB Master*, a database program that's included in the packages' cost. (For a review of *Advanced DB Master*, see "Project: Database, Part 3," PC, Volume 3 Number 13.)

Says Augelli of the choice, "We looked at the feasibility of doing it our-

selves versus using another database system, and we came to the conclusion that we couldn't come up with that much better a product in the long run. All we'd end up doing would be to triple development costs and therefore have to triple our sales price. One of my corporate jobs prior to MetroGnome was overseeing software package reviews for micros, so I'd had an opportunity to examine just about every database that had come down the line. I just don't feel that there's anything comparable to *DB Master* in terms of search and retrieval, which are the most important aspects of our systems. Also, *DB Master* allows us to handle multivolume files. In the Session Log section of *Sessions Plus*, for example, you end up being able to store about 350 records on a disk. But if you want more in the file than that, you just tag a second disk as Volume 2, and the program will guide you back and forth between them as needed."

MetroGnome also likes *Advanced DB*

Looking for
LOWEST
PRICE ON
SOFTWARE

SEE PAGE
48

LOGICSOFT

TOLL FREE
1-800-845-3491

NYS 516-741-0043
CAN 416-283-2354

CIRCLE 295 ON READER SERVICE CARD

► Pascal and C Programmers

► Blaise Computing's productivity tools allow Pascal and C programmers to develop reliable software taking full advantage of the capabilities of the IBM PC and XT. Support for Microsoft and IBM Pascal, Microsoft (Lattice) C and C-86 is provided.

TOOLS

All Source Code is Included

Total string capability, complete screen access, keyboard handling, a graphics interface, access to all BIOS functions, and much more are provided in over 40 routines.

TOOLS 2

All Source Code is Included

A general DOS gate allows you to access any DOS 2.0 function from Pascal or C. Program execution and DOS internal command execution are supported as high level calls.

VIEW MANAGER

Source Code available

VIEW MANAGER is a screen support system of a mainframe for the IBM PC/XT. Screens are constructed with a true Screen Painter supporting any attribute or color and the screens are stored efficiently in a Screen Database. VIEW/LIBRARY supports access to screens and true block mode data capture and display from application programs.

TOOLS	125.00
TOOLS 2	100.00
VIEW MANAGER	275.00
VIEW MANAGER (with Library Source)	425.00
MS Pascal Compiler	275.00
Microsoft C Compiler	450.00

BLAISE COMPUTING INC.

2014 Blake St. Berkeley, CA 94704 415/540-5441

CIRCLE 150 ON READER SERVICE CARD

PC MIX

Master because it allows the company to offer its customers the actual database, not just a run-time module as with *dBASE II*. When you buy a top-of-the-line *MetroGnome* product, you are buying the database itself, which means you can develop your own database applications if you wish. It isn't likely, though, that you'll be doing anything musical with it. Given the limits of a nonrelational database, *MetroGnome* has pretty much covered the bases.

Catalog Plus also covers staff and writers, credits, awards, royalty income, royalty payments, song expenses, expense account listings, contacts lists for record executives, producers, promoters, and publicity contacts.

Sessions Plus is a business management database for the small or large recording studio, with provisions for session and rental logs, maintenance records, equipment and tape library inventories, and directories of talent, rental gear, clients, and suppliers.

Pickers Plus, a name that is proof positive of *MetroGnome's* Nashville origin, serves the session or semiprofessional musician, with listings for session schedule, session log, band schedule, band income, expenses, credits, personal inventory, and an action list.

Writers Plus is a songwriter's home business package, covering royalty income, expenses, awards, an action list, song demos, song releases, classifications, and an overall song register. *MetroGnome* even included a built-in word processor that's just big enough to handle lyric sheets.

Labels Plus generates cassette and reel-to-reel tape labels and inserts. If you have a song in your catalog, all the data for it can be ready to print up when you want to provide information to go with your tapes. This program is aimed primarily at the small studio. It's all automatic, can print hundreds of copies, and will prevent a lot of writer's cramp.

Printouts, in all of these packages, are currently preselected summary sheets.

That will change in the next release, which will have more extensive formatting and will allow the user to choose the information to be printed out. (Source code listings are available to those who want to customize before the second release is available.)

Sales, so far, have been good—but there's plenty of room for growth.

"People are cautious, as well they

Catalog Plus covers staff and songwriters, royalty income, royalty payments, and much more.

should be," observes Augelli. "Particularly in the music business where new things come along every 5 minutes. But we just placed a system with Word Music, the largest gospel publishers in the world, with offices in Los Angeles, Indiana, and Nashville, and... they're ecstatic. It's very pleasing."

"In fact, we get a lot of people calling us up not just to ask about our software but to ask about computers in general. What kind to buy. What software to use with it. We seem to be on our way to being a kind of voice for the whole concept of the computer in this industry, and that's very satisfying."

Time for a Change

MetroGnome's database packages, like Ariel Corporation's RTA 331 Spectrum Analyzer, are so cost-effective that they may cause major changes in the way the music business does its business—which down the line may bring about major changes in the music itself. You don't move one without also moving the other.

I like that. If our music is blossoming, then so are we. ■

Telecom Telecom

Micro Flash is Reliable

- In our 4th year of business (*One of the Originals!*)
- Positive buying power within the industry meaning well-stocked inventories and a consistent supply
- A reputation as specialists in the business and corporate marketplaces
- A dedicated approach to honest customer service

Micro Flash Guarantee

- We sell the latest versions
- We support what we sell
We won't tell you to call the publisher or manufacturer for after-sale support.
We want you to call us!
- We won't sell you anything we don't think you need
- If the product is defective when you receive it — we'll replace it!

Micro Flash Terms

- MasterCard or VISA — with no credit card surcharge added
- Mail Orders accompanied by certified or cashier's checks
- Call our Credit Manager for information on institutional purchase orders
- All returns must have a Return Authorization Number
- \$100.00 minimum order
- Products and prices subject to change without notice

Micro Flash Shipping

- \$6.00 for UPS surface (except for printers and monitors)
- Add \$3.00 per item for UPS 2nd Day Air
- All shipments fully insured at no extra charge
- Call for information on foreign orders, US Mail, CODs
- Overnight delivery service available

PRODUCTS FOR IBM PC & COMPATIBLES

HARDWARE & PERIPHERALS	RETAIL PRICE	MICRO FLASH
AST Research SixPackPlus 64K	\$ 395.00	\$ 299.00
AST MonoGraph Plus (Lotus Compatible)	505.00	495.00
64K Ram Chip Sets "81 per K"	100.00	84.00
CDC 9409 DS/DD Disk Drive ..	525.00	229.00
Devong 10 MB External	2395.00	1785.00
Everex 10MB Internal 1/2 Height	1150.00	989.00
Hewlett-Packard Intel 8087 Chip ..	175.00	157.00
Hayes Smartmodem 1200 ...	999.00	499.00
Hercules Graphics Card	499.00	399.00
Panasonic Half-Height Drives	495.00	189.00
Pentronics Color Plus (Symphony Compatible) ...	590.00	399.00
Printers — Epson, Oki, Diablo, NEC, Toshiba, Brother, Others	\$CALLS	
Princeton Graphics Max 12 Amber Monitor	249.00	199.00
HX-12 Hi-res RGB Monitor ..	895.00	524.00
SR-12 Super Hi-res RGB Monitor	799.00	629.00
Scan Doubler	249.00	214.00
PTI Detachable Power Supply ..	359.00	329.00
Disquettes — 3M, Dysan, Others	\$CALLS	

SOFTWARE

Ashton-Tate dBase III	\$ 995.00	\$ 499.00
Upgrade from dBase II		\$CALLS
FRAMEWORK	995.00	549.00
8PI Systems Accounting™ ea.	595.00	399.00
DayFlo (for IBMPCXT)	495.00	371.00
Humen Edge Sales Edge	250.00	199.00
Microim Inc. R-base 4000	485.00	349.00
Microsoft® Multiplan™	195.00	149.00
Multi-Tool™ Word	375.00	249.00
Multi-Tool™ Word with Mouse	475.00	325.00
Multi-Tool™ Cash Plan	125.00	94.00
Basic Compiler*	395.00	279.00
Business Basic Compiler	900.00	419.00
C Compiler	500.00	349.00
Pascal Compiler	300.00	224.00
Fortran Compiler*	350.00	244.00
Coval Compiler*	700.00	519.00
Sort Facility*	195.00	149.00
Macro Assembler	100.00	74.00
Project	250.00	199.00
Microstat Crosstalk XVI	195.00	119.00
MultiMate Word Processor	495.00	299.00
Peter Norton Utilities	80.00	55.00
RoseSoft ProKey	129.95	85.00

*Also available in Apple IIc Format

PRODUCTS FOR APPLE MACINTOSH

Devong MacDisk 10 MB	\$2395.00	\$2099.00
Haba Systems Habadex	200.00	159.00
Memorex 3 1/2" Diskettes	89.95	59.00
Microsoft® Multiplan™	195.00	149.00
Basic Interpreter	150.00	122.00
Chart™	125.00	99.00
Multi-Tool™ Word	195.00	149.00
Odesta Helix	395.00	299.00

Many other products available at comparable discounts! Quantity pricing available

For product information, price quotes, technical support and California orders, please call

415/680-1157

To order from outside California, call

800/458-2433

Telex # 353199 MFLASH UD



1110 Burnett Avenue, Suites J & K
Concord, CA 94520

Member: Better Business Bureau, Chamber of Commerce
Listed: Dun & Bradstreet

**THERE'S ONLY ONE PC/XT
MODEM DESIGNED TO
LET BOTH YOU
AND YOUR
COMPUTER
TALK.**

"That's it—just one?"



**ON THE
SAME LINE.**

Only the PC: IntelliModem™ lets you switch repeatedly between voice and data communications.

Any old modem will let computers talk. But to move from talking or listening to sending and receiving data—at the touch of a single button—there's only one modem that's smart enough. The 1200-baud PC: IntelliModem from Bizcomp.

Let's say you want to transfer some files, and you want to talk to the person receiving them, both before and after the transfer. With other modems, you'd have to hang up, re-dial, or plug and unplug a bunch of cables. Not very convenient, especially if you use your phone a lot, and you have only one line.

With the PC: IntelliModem, you just plug your regular handset into the back of your IBM PC/XT. That's it. You're now ready to make connections with computers—and people—much faster and more conveniently. It's like getting a modem and a telephone for the price of a modem alone.

The ultimate status seeker.

The PC: IntelliModem also monitors your telephone line's status more closely than other modems. It listens to the line much like you do, and detects signals for dial tone, ringing, busy and voice—some of which other modems completely ignore. It then automatically takes the

Make sure your modem has all these PC: IntelliModem features

Integrated Voice/Data

- Switch between voice and data communications
- Programmable telephone handset jack

Status Reporting

- Line status detection (dial tone, busy, ringing, voice answer, modem answer, incoming call)
- Audio monitor
- Programmable LED

PC: IntelliCom Software Included

- 99-name on-line telephone directory
- Auto-dial, auto-repeat dial, auto-answer
- Link to another number if busy
- File transfer
- Data capture to diskette
- Programmable auto log-on sequences

Compatible with Crosstalk™/PC-Talk III™

Receive Sensitivity: -50 dBm

Speeds: 110, 300, 1200 baud

appropriate action, so there's less chance of error in making a connection. And since the PC: IntelliModem gives you a constant indication of what's going on, you always know how your call is progressing.

A soft touch to operate.

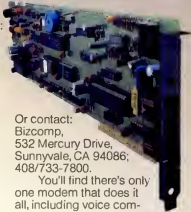
Included with our single plug-in modem board is PC: IntelliCom,™ our exceptionally easy-to-use software package. It guides you step by step during use, through on-screen menus, entry instructions, an

audible buzzer and a handy HELP key. There's even a demonstration program that runs through the main features.

All software tasks are activated by pressing function keys, which are clearly labeled on the screen. That means you can go from talking to someone, to transferring data, and back to talking again—all with single keystrokes.

The one that's out of sight.

Even though the PC: IntelliModem is hidden inside your PC or XT, you should see how it works. So go to your dealer and ask for a demo. Also ask about our 2-year warranty, free NewsNet™ connect time and our modest \$499 price.



Or contact:
Bizcomp,
532 Mercury Drive,
Sunnyvale, CA 94086;
408/733-7800.

You'll find there's only one modem that does it all, including voice communications: the PC: IntelliModem.

PC IntelliModem and PC IntelliCom are trademarks of Business Computer Corporation. IBM is a trademark of International Business Machines Corporation. Crosstalk is a registered trademark of Microsoft Inc. PC-Talk III is a registered trademark of The Highlands Press Inc.

BIZCOMP®
We've got people talking.

THE FAST-MOVING, HARD-WORKING, CASH-SAVING JUKI 6100.

ONE HONEY OF A DAISYWHEEL PRINTER.

JUKI 6100: the only daisywheel printer that gives you all these quality features: • priced under \$600 • compatible with most personal computers (IBM, Apple, Kaypro, etc.) • lightweight • quiet • prints graphics • bidirectional • 2K buffer memory (expandable to 8K) • bidirectional tractor feed option • proportional spacing • 100-character drop-in daisywheel • uses inexpensive, easy-to-find IBM Selectric II® ribbon.

JUKI 6100: feature for feature, it's the best all-round printer anywhere. So when you're picking a daisywheel printer, be picky—and make a bee line for JUKI!



JUKI®
The worker.

JUKI INDUSTRIES OF AMERICA, INC.

ACORN DATA PRODUCTS
7042 S. Stevens Pkwy. Ste 30
Englewood, CO 80112
(303) 799-8900
Serving
MT WY CO UT NM

OSMAN COMPUTER TECHNOLOGIES
8866 Old Columbia Rd.
East Seneca, NY 13057
(215) 437-4866
Serving
UPSDR NY

BUTLER ASSOCIATES, INC.
624 Winchester St.
Newport, MA 01861
(617) 844-5270
Serving
ME NH VT MA CT RI

SOUTHERN MICRO DISTRIBUTING
8708 Royal Lane
Irving, TX 75063
(214) 258-8636
Serving
TX OK AR LA

CM DISTRIBUTION
7023 Little River Pkwy.
Alexandria, VA 22303
(703) 750-3840
Serving
MD DE DC VA

STAR-TROIC DISTRIBUTING CO.
22875 Fremont Pkwy. Ct.
Farmington Hills, MI 48334
(313) 477-7586
Serving
ME NH OH KY IN PA NY

COMPUTER SERVICES INTL.
560 Sunset Ave.
Englewood Cliffs, NJ 07632
(201) 569-6300
Serving
METRO NY E PA NJ

TECHNOLOGY MARKETING CORP.
2301 White Pine Lane Ste 100
Dallas, TX 75214
(214) 243-7884
Serving
TX OK AR LA

CYPRESS DISTRIBUTING CO.
12861 Model Ave. Ste 100
San Jose, CA 95125
(408) 257-8800
Serving
TX NC SC MS LA AL FL GA

WTEK
3205 Southview Ave.
San Marcos, CA 92068
(619) 744-4005
Serving
S CA

DEWITT ASSOCIATES INC.
7860 Gurney Dr.
Orlando, FL 32809
(305) 858-7400
Serving
TX NC SC MS LA AL FL GA

WESTERN MICRO TECHNOLOGY
10545 Buhr Road
Cupertino, CA 95014
(408) 725-1862
Serving
W CA WY AZ

INFORMATION SYSTEMS INC.
2420 E. Gaston St. Box 4
Annapolis Heights, IL 60005
(312) 228-5480
Serving
WI IL MN IA MO NE ND SD KS

NATIONAL HEADQUARTERS JUKI INDUSTRIES OF AMERICA, INC.
DA, DIVISION
298 Market St.
Sausalito, CA 94965
(415) 355-3556

MICRO SOURCE OF TEXAS INC.
670 International Pkwy.
Richardson, TX 75081
(214) 880-5111
Serving
TX OK AR LA

WEST COAST JUKI INDUSTRIES OF AMERICA, INC.
CALIFORNIA DIVISION
2655 Larkin Blvd.
Berkeley, CA 94705
(415) 325-3556



P R O J E C T:

DATA BASE

Part 6

PC heads for the homestretch of its seven-part database derby with an impartial look at the crowd favorite, dBASE II, and analyses of other Category 3 offerings.

In this penultimate installment of Project:Database, we complete our coverage of databases with procedural or programming capabilities. It's about time, therefore, that we reviewed *dBASE II*, the progenitor of the personal computer database explosion.

We knew as we planned Project:Database that Ashton-Tate's bestseller had become the industry standard—and many users' first love. Precisely for that reason,

we wanted to be sure we didn't accord it special treatment in the evaluation process. When selecting a reviewer, we decided he or she could like *dBASE II*, but anyone with professed adoration for the package was passed over.

Even though all of our authors have been admonished to bury preconceived notions, the reviewers of this group have found admirable qualities in all the databases. The reviewer of *Condor 3* felt it

was such a fine example of a classic relational database that he is using it in teaching a college database course. *MAG/base III* is tailored for users with existing BASIC programs and files. *RL-1 DATA BASE* and *OPTIMUM* stand out as applications development tools, while *Day One* is completely menu driven.

This issue should please many database users, even those who are still true to *dBASE II*. —Stephanie Stallings

Condor 3: Mellow and Marvelous

LAST. NAME	EMP. NUMBER	DEPT. NAME	SALARY
Gilbert	153570	Shipping	29200.00
Falk	155320	Shipping	29200.00
Kositchek	151820	Shipping	29200.00
Street	150070	Shipping	29200.00
Seymour	146570	Shipping	29200.00
Harrison	144820	Shipping	29200.00
Ward	148320	Shipping	29200.00
McClenneghen	139570	Shipping	29200.00
Henkel	143070	Shipping	29200.00
Bittner	137820	Shipping	29200.00

Condor 3 lists display salary data by combining the data with a form in response to a LIST command specifying field names.

Condor 3 is a textbook example of what a relational database management system should be. The program has most of the features of *dBASE II*, but it makes using those features much easier. The two excellent manuals are clear and filled with examples. A cursory reading combined with my intuition allowed me to do useful work with *Condor*.

Defining a new database (called a database in *Condor*) begins with the creation of a data entry form. At *Condor's* A>> prompt, type the command DEFINE. The user interface is a command set, but certain commands invoke menus that appear at the bottom of the screen.

To design a form, you arrange fields on a screen that is blank except for a small menu. Each field name is placed within brackets, followed by underlines indicating the length of the field. You can also include comments and instructions for data entry operators on the form. After

you are satisfied with a form, you define the field types, a process through which *Condor* prompts you. The available data types are alphabetic, alphanumeric, numeric (integer), numeric with decimal places, dollar, and Julian (date). *Condor* then displays each field name, field type, field length, minimum length, any default values, and, if applicable, a notice that the field is required. Unlike many other database managers, *Condor* lets you change a file's format and redefine the structure at any time, using the *FORMAT* command.

When you finish defining a file, the program asks you if you want to index it. Although this is the obvious time to index, which you must do in order to perform certain kinds of searches later, if you want to index a file at some other point, the *INDEX* command conveniently allows you to do so.

Data entry is straightforward and easy. *Condor* automatically displays default values for fields, and it provides an Auto-Repeat option that re-enters values from a previous record. Data from outside files can also be read into a form if the record structures of the files match. I had no problem importing the *PC Magazine* test files. *Condor* can write files in five different ASCII formats, so you can easily export its files to other programs.

Condor's query language is the primary way to perform retrievals of all types:



one-time reports, ad hoc requests for information, browsing, and sorts. The query language is a rich one with a classic relational terminology. For example, to retrieve names and employee numbers from a file of employees, you would enter: *LIST PERSON BY EMP.NUMBER, LAST.NAME, FIRST.NAME*. To print the output, substitute *PRINT* for *LIST*. To create a temporary file use *PROJECT* instead of *LIST*. *PROJECT* is especially useful; you can use it to create a new database with the attendant file definition and form. You can save a temporary file by typing *SAVE* followed by a new filename. The query language also makes it easy to merge and sort files by specific fields in order to obtain just the information you need. *Condor's* sorting time is average for a program of its type.

Procedural Language

Condor also lets you construct a permanent command file with which to batch-execute commands. This feature, called the procedural data manipulation language, provides you with seven extra commands in addition to the query language: *IF*, *ENDIF*, *GET*, *LET*, *MESAGE*, *END*, and *ABORT*. Noticeably absent from the list is a *DO* command; the available command set does not include a way to loop or control a loop. Still, the existing commands can handle many updating processes.

Say, for example, you had two files with current information on employees.

Condor 3

Condor Computer Corp.
2051 S. State St.
Ann Arbor, MI 48104
(313) 769-3988
List Price: \$650

Description: Relational

Requires: 64K RAM, two disk drives,
PC-DOS 1.1.

Records per File: 32,767

CIRCLE 799 ON READER SERVICE CARD

These files would be periodically updated in a batch-processing mode using an UPDATE.CMD file. The update process creates new, up-to-date files that can be checked and then substituted for the obsolete files. The updating process captures the changes in a RESULT file, to which you can add the date with the COMPUTE command.

To maintain historical information about changes to the files, you can keep a HISTORY file that will contain all the RESULTS files created when you update database files. The HISTORY file becomes an archive containing the records of changes over time.

Report Generation

Condor's REPORT command is a full-blown report writer that I couldn't learn to love. Producing a report involves five steps: You must first plan to format the report on paper, then format the screen to match it. You specify or define each item on the screen, revise if necessary, and, finally, print out the report. The process sounds tedious and it is, but in normal business use you would save a report format and reuse it every time you updated the records. For one-time use, however, formatting a report with REPORT is more trouble than it's worth.

Fortunately, you can get around REPORT by relying on the query language commands PRINT BY and TITLE. With PRINT BY you can select the fields you want to see; with TITLE not only can you print a title line, but you can also define line width, page length, and spacing. The combination lets you turn out great reports very easily.

Condor has been around for about 7 years, a long time in this industry. It runs on many machines, and it's standard equipment on several, such as the Hewlett-Packard 150. By now the bugs have all been worked out, and the program is a joy to use. I felt comfortable with Condor right from the start, and I've become more and more fond of it with practice.

—James Perotti

dBase II: The Standard Bearer

```
USE G3PERSON
LIST STRUCTURE
STRUCTURE FOR FILE: C G3PERSON DBF
NUMBER OF RECORDS: 00500
DATE OF LAST UPDATE: 03/31/84
PRIMARY USE DATABASE
FLD  NAME      TYPE  WIDTH  DEC
001  FIRST     C      011
002  LAST      C      015
003  EENO      C      004
004  ADD       C      030
005  CITY      C      020
006  STATE     C      002
007  ZIP       C      005
** TOTAL **                00090
```

The structure of the employee record in dBASE II.

Ashton-Tate's dBASE II is the Kleenex of database systems—the product that everyone thinks of when the word *database* is mentioned and the standard by which they judge all other databases. A subindustry has grown up around this software. Some firms provide training courses for dBASE II; others specialize in producing run-time applications software based in dBASE II. Authors have made their fortunes writing books to explain the program's uses and techniques. Companies exist to produce software for the sole purpose of helping dBASE II programmers in the development of new applications.

Still other firms develop programs that either interface directly with dBASE II or with the program's files to provide graphics, statistical analysis functions, and the like. The list of third-party suppliers of dBASE II add-ons grows every month.

dBASE II, Version 2.4

Ashton-Tate
10150 W. Jefferson Blvd.
Culver City, CA 90230
(213) 204-5570
List Price: \$495

Description: Relational

Requires: 128K RAM, two disk drives, DOS 1.1.

Records per File: 65,535

CIRCLE 757 ON READER SERVICE CARD



(For a comprehensive review of some of these products, see PC, Volume 3 Number 2 and June 1984 PC Tech Journal.)

While the program does have limitations, especially when compared with mainframe systems or software that has been derived from mainframe systems, the limitations are based primarily on capacities (maximum number of characters per record, maximum fields per record, number of open files at one time, and so forth) rather than on functionality. All of the functions expected of database management system are in dBASE II, as well as a few unexpected ones. dBASE II's range of database functions makes it a useful tool for a wide range of tasks, from simple name and address files to complex appli-

```
REPORT
ENTER REPORT FORM NAME CITYLIST
ENTER OPTIONS. M=LEFT MARGIN. L=LINES/PAGE. W=PAGE WIDTH W=80
PAGE HEADING? (Y/N) Y
ENTER PAGE HEADING. CITY LISTING
DOUBLE SPACE REPORT? (Y/N) N
ARE TOTALS REQUIRED? (Y/N) N
COL WIDTH CONTENTS
001 27.TRIM(FIRST) + " " + LAST
ENTER HEADING NAME
002 20.CITY
ENTER HEADING: CITY
```

A portion of a *dBASE II* interaction for creating a report. Fields for each record are printed horizontally by the report generator, and any line greater than the specified width will wrap.

cations such as a full accounting system. But there's a catch. With low-end, menu-driven systems designed solely for simple file management, you sacrifice speed and power for simplicity of use. In a command-driven system like *dBASE II*, on the other hand, the reverse is true—ease of use is sacrificed for the advantages of speed, versatility, and computing power.

As a simple file-management system, *dBASE II* offers little of the ease of use common to the menu-driven programs reviewed in earlier installments of "Project: Database." *dBASE II* requires that you know which of the many commands available in the system to use at any particular point in a session. Help screens are available, especially in the current Version 2.4. Still, long hours of learning *dBASE II* syntax, as well as the commands themselves, are a normal prerequisite to making the most of this type of software.

Even with this apparent lack of congeniality, *dBASE II* can be effectively used by novices to create and maintain a database file. Several of the commands (most notably CREATE and REPORT) engage you with a dialogue of easily answered screen prompts for data. If you wish to define a file and issue the CREATE command, you will be presented with a series of questions concerning the name of the file and information about each field's

name, length, and type (character, numeric, or logical). If you add or change a record using the APPEND or EDIT command, the program will bring a default mask onto the screen for you to fill in or alter. The default data entry screen is useful and clearly defined, making use of inverse video or color to define the areas to be filled in at the keyboard. In response to incorrect command entries, the software responds with yet another question, CORRECT AND RETRY (Y/N)? that helps cut down keystrokes.

In short, you can get *dBASE II* to easily perform required tasks if you've learned basic database-management functions and if you're willing to take the time to look up the appropriate commands as needed until familiarity makes them second nature.

Do-It-Yourself Menus

Where *dBASE II* truly excels is at the high end of database system use, the creation of complex multiple-file databases and applications. As you gain familiarity with the program, the range of its possible uses also grows. It's nearly impossible to outgrow *dBASE II*—something that cannot be said of simpler file-management systems. *dBASE II*'s command language capability (see "Micro-Linguistics: Languages for the PC," *PC*, Volume 2 Number 4) offers a flexible tool that can, with one command (MODIFY COMMAND,

oddly enough), turn the experienced *dBASE II* user into a programmer capable of producing miracles. When you get to a point where you can use *dBASE II* as a program development tool, those long hours spent learning its syntax pay off.

The command language enables you to utilize the power of the command structure to set up batches of commands and store them in a *dBASE II* command file named, for instance, MYPROG.PRG. The commands may be executed merely by keying DO MYPROG. Through the use of this procedure, the user may develop highly complex programs utilizing DO WHILE loops, IF-ELSE-ENDIF statements, and a full range of logical operators. You can take this one step further by setting up a DOS batch file that will automatically start *dBASE II* and execute the command file.

dBASE II's built-in language offers a bonus that many of the more familiar languages, such as Pascal and C, don't: interactive debugging. SET STEP ON and SET ECHO ON can walk even the most timid programmer line-by-line through a command file, pointing out where things go wrong.

These features make *dBASE II*, and its recently released cousin, *dBASE III* (which will be reviewed in the next issue of *PC*), something truly special: software you can't grow out of. The more you use *dBASE II*, the wider the range of applications you can tackle with it. It's an infinite loop.

Reports Made Simple

To produce a report of file data, you first open the file with the USE command, verify the names and widths of the fields to be included in the report (with either DISPLAY or LIST STRUCTURE), and then enter the single word REPORT. *dBASE II* responds with a series of prompts for data defining the report. After defining the last column, you end the dialogue by hitting the Enter key.

The report format thus created is automatically stored on disk (with a .FRM

extension added by *dbase II*), and the report itself scrolls on screen.

To produce a report listing only selected records from the file—selecting records where the state field equals NJ, for example—the command becomes: REPORT FORM (filename) FOR STATE = "NJ". To make a hard copy of the report, the words TO PRINT are added to this command line.

For more advanced users, *dbase II* offers the capability to create format files (extension .FMT). These files, similar in approach to the command files, allow you to custom-design data entry screens and reports, placing data fields exactly where desired and permitting the use of pre-printed business forms such as invoices. With format files prepared for them, less-experienced users can use the system for specific applications. Input screens can be designed to present the person entering data with a formatted screen as simple as anything presented in a "rolodex-style" database program. Additionally, error checking, more extensive than anything found in those systems, can be "programmed" by the designer of the application. Some applications—updating a customer master file based on a daily transaction file, for example—may require processing more than one file at a time. *dbase II* provides for multile processing and, although only two files may be active at once (*dbase III* increases the maximum to ten), the ability to generate instructions allows you to process many more than two files at one time—you simply activate files when needed and allow them to be deactivated when others are needed.

For those who aspire to database proficiency, we heartily recommend *dbase II*. It has enough power to perform basic database management functions well; it has a proven track record and a wide user base, and a wealth of supplemental software, literature, and training material exists to take the sweat out of those hours of learning and labor. —Barbara E. McMullen and John F. McMullen

Mag/base III: A Good Choice for BASIC Users

FILE DEFINITION	File: <file description>	MAG / b a s e
CHANGE		06/01/83

Define field number (<#>)		
1. Field ID	<*****>	
2. Field Description	<*****>	
3. Field Type (A;N;S;D;Y;I;R)	<#>	
4. Minimum Field Length	<##>	
5. Maximum Field Length	<##>	
6. Decimal Place	<##>	
7. Minimum Value	<*****>	
8. Maximum Value	<*****>	
Enter desired change number, RETURN=Page, or 'END'=		

In *MAG/base III*, fields are defined and altered with a File Definition menu.

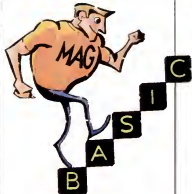
Can a classic file management system written in BASIC find a place in today's market when it's priced at \$795? That question passed through my mind as I began reviewing *MAG/base III*, a product of MAG Software, Inc. *MAG/base III* is the most sophisticated version of a program that comes in two other, less-expensive forms. *MAG/base I*, at \$295, has most of the basic features of *MAG/base II* and *MAG/base III*, which MAG

calls its application development system. Each version is fully compatible with the less-powerful ones and includes all their

MAG/base III
MAG Software, Inc.
21054 Sherman Way #305
Canoga Park, CA 91303
(213) 883-3267
List Price: \$795

Description: Relational
Requires: 128K RAM, two disk drives, DOS 1.1.
Records per File: 32,000

CIRCLE 756 ON READER SERVICE CARD



Input Screen Specifications

Method	Capabilities				
	No. screens per file	No. files per screen	Simulate paper forms	Link help messages/ prompts to a field	Master/detail relationship
"Painted"	1	Unlimited	Yes	Yes	Yes
Automatic (fixed) but "painted"/programmed screens may be generated through use of the command language.	Unlimited	2	Yes	Yes	Yes, programmable.
Prompted	1	1, though more available with programming.	Yes, but limited to simple 2-column forms.	Yes	Yes, programmable.
Choice of 3: automatic (fixed), programmed (using high-level interfaces to Pascal, Assembly, FORTRAN or BASIC); or menu driven via Relational Editor.	Unlimited	1 with fixed screen; unlimited with high-level programming.	Yes, using high-level language interface.	No	Yes
Automatic, "painted," and programmed.	50	Unlimited	Yes	Yes	Yes
Prompted	Unlimited	9	Yes	Yes	Yes

1. Follow instructions on the other side

Back

0018-0018-0018



Inverted Back

1. Follow instructions on the other side

Folded edge of the page

Foldout slip-sheet

001-SlipSheet-Gloss



Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Name	Data Model	Marketing Features		
		Length of Time on Market	Number of Sales	Price
Condor 3 Condor Computer Corp. 2051 S. State St. Ann Arbor, MI 48104 (313) 769-3988	Relational	Since 1977	Over 110,000	\$650
dBASE II (Version 2.4) Ashton-Tate 10150 W. Jefferson Blvd. Culver City, CA 90230 (213) 204-5570	Relational	Since 1981	240,000	\$495
MAG/base III MAG Software, Inc. 21054 Sherman Wy. #305 Canoga Park, CA 91303 (213) 883-3267	Relational	Since 1981	Over 10,000	\$795
RL-1 DATA BASE (Version 1.21) ABW Corporation P.O. Box M1047 Ann Arbor, MI 48106 (313) 663-3011	Relational	Since February 1983	About 200	\$495
OPTIMUM (Version VII) Uveon Computer Systems, Inc. 300 S. Jackson #250 Denver, CO 80209 (303) 631-7000	Relational	Since 1981, but only sold to system houses until April 1983.	3,500	\$595
Day One Day One Software, Inc. 618 Shoemaker Rd. King of Prussia, PA 19406 (800) GET-DAY1	Relational	Since September 1983	About 600	\$695

```

** SELECT THE FIRST HOUSE LISTED IN EACH NEIGHBORHOOD
SR: F008 NE P008 ! COMPARE CURRENT NGHD TO PREV. NGHD

** SELECT FIRST HOUSE LISTED THAT IS $100,000 OR MORE AND
** THE FIRST HOUSE THAT IS $150,000 OR MORE
SR: (F011<=100000 AND P011<100000) OR (F011)=150000 AND
    P011<150000 ! (Actually on one line.)

** SELECT RECORDS WHERE FIELD 13 EQUALS TODAY'S DATE AND
** 40% OF FIELD 10 IS GREATER THAN OR EQUAL TO 12.5
SR: F013 = SOT AND F010 * .40 >= 12.5

** SELECT RECORDS WHERE CALCULATION IS GREATER THAN
** CALCULATION 30 FOR PREVIOUS RECORD
SR: (F010+15)/33 >= C30

```

The asterisked lines describe the select record statement expressed in *MAG/base III's* report definition language.

functions.

MAG/base III's set of programs occupies most of four disks. One of these contains modules primarily intended for experienced programmers who wish to integrate data management routines with other programs written using the Microsoft Business BASIC or Digital Research CBBO (CBASIC) compilers, which are *MAG/base III's* native languages. The other three disks contain the core of the data management system itself. The most commonly used functions could probably be squeezed onto a single disk, but anyone expecting to need the program's full facilities should probably plan to use a hard disk.

MAG/base III's documentation comes in two parts for easy digestion. First is a "starter kit" that contains the program disks and three short manuals: an installation guide, a primer, and a desktop reference. These three guides are the same for all three versions of *MAG/base*. The rest of the documentation comes in a loose-leaf binder, the contents of which depend on the version you have purchased. For *MAG/base III*, the binder includes updates for the current version, a general reference section, segments on the report writer, programming aids, and *MAG/sam*, a separate subroutine system that can be used to index standalone programs in BASIC.

As its emphasis on BASIC might suggest, *MAG/base III's* roots are in the early history of "serious" microcomputer software; the developers first set up shop (under the name Microcomputer Applications Group) in 1978, and some of the most

As its emphasis on BASIC might suggest, *MAG/base III's* roots are in the early history of "serious" microcomputer software.

powerful versions of the program continue to run under CP/M. For example, the PC-DOS 2.0 version that I reviewed is restricted to about 32,000 records, but there are some CP/M versions that can theoretically accommodate almost a million records. (The version that runs under Digital Research's Concurrent PC-DOS recaptures some of this power.) Also, *MAG/base III* currently makes no use of PC-

specific cursor or function keys.

MAG/base III does not include an on-disk tutorial, but it is not hard to install the program by reading the brief installation guide. You can specify available disk drives, printer columns, and memory (which helps to determine the maximum length of records *MAG/base III* will handle).

You can restrict entry to *MAG/base III* by using a password. The program includes modules that allow you to define different levels of access codes for files and even custom menus that may include external programs. For organizations in which several people with different access requirements will be using sensitive data, this ability is a significant advantage.

Once you have arrived at the main *MAG/base III* menu, you may choose among all the major functions and utilities. One necessary function is setting the current date, since *MAG/base III* does not pull it automatically from the operating system. In addition to entering, examining, and listing data from existing files, you may print forms and custom reports, and define new files, index keys, menus, passwords, and output formats.

MAG/base III comes with two predefined sample files of the customers and properties of a hypothetical real estate firm. Working with these files, which include several index keys to locate properties such as neighborhoods, prices, and number of bedrooms, is a good way to learn how to manipulate existing data files—perhaps all that some intended users of this system might need to do.

You can make queries and "browse" through the database using key fields quite rapidly; you can access all files and indexes you have created through the *MAG/base III* system by number from menus. Unfortunately, the program lacks full-screen editing; new field entries or corrections must be typed at the bottom of the screen, which is then updated. Another annoyance is having to terminate each function by typing END.

(Text continues following the Database Chart.)

Entry Editing Capabilities

None	Range Tests	Specific Values	Default Values	Table Lookup (to an Outside File)	Verify (Requires Data to be Input Twice)
—	Yes	Yes	Yes	Yes	No
—	Programmable	Programmable	Yes, may be automatically set to the values of the last record input; also programmable.	Programmable	Programmable
—	Yes	Yes	Programmable	Programmable	No
—	Yes	Yes, with high- level interface.	Yes	Yes, with high- level interface.	No
—	Yes	Yes	Yes	Yes	Yes
—	Yes	Yes	Yes	Yes	No

Entry Editing Capabilities (cont'd)			Adaptation to PC		
Required Field	Date Tests/Date Conversion	Other	ASCII Characters Only	Graphics Symbols	Color
Yes	Automatic; can do calculations on date field.	Checks data type.	Yes	No	Yes
Programmable	Programmable	No	Yes	No	A "SET COLOR TO" command allows users to vary colors on screen.
Yes	Yes	Checks data type, minimum and maximum length of strings.	Yes	No, except in predefined screens.	No
No	Date type and high and low values can be checked. Date arithmetic provided.	No	No	Yes, some symbols used in form generation.	No
Yes	Yes	No	No	Yes, limited.	Yes
Yes	Yes; includes validation for leap year.	Format validation for phone, social security, and zip code entries.	Yes	No	No

				User Interface	Files
DOS 2.x Subdirectories	Alternate Input Methods (mouse, etc.)	Files Across Multiple Drives	Function Keys		Method of
					Data dictionary or other means
Yes	No	Yes	Yes, used occasionally.	Commands	Yes; the form, or data dictionary, is inseparable from the file.
No	No	No	Yes; also programmable.	Prompting within APPEND and EDIT commands. At other times interface appears as " ", indicating that a command may be entered.	Yes, data dictionary.
No	No	No	No	Menu-driven, verbal help screens, and prompts.	Yes, data dictionary.
No	No	No	Yes	Prompting and commands	Programmable
Yes	No	No	Yes, programmable.	Prompting	Yes, data dictionary.
No	No	No	Yes, for two-letter commands.	Menu-driven	Yes, specification files.

Files (cont'd)

Specification					
Things You Can Specify					
Must files be built/modified only from data dictionary?	None	Field data	Tokens, aliases or synonyms	Index data	Permissions/security
Yes	—	Alphe, alphanumeric, dollar, etc.	No	Yes	No
Structure may be copied to a new file. User may create a new file without defining it when it results from 2 files being joined via JOIN TO command.	—	Name, type, length, decimal places.	No	User defines indexes. Up to 7 index files may be opened and updated at once. Uniqueness is not required.	Programmable
No, may also be modified using BASIC.	—	Yes	Programmable	Yes	Yes, 32 access codes for each of 16 passwords.
No	—	Yes	No	Yes	No
No, may also be modified by relational commands.	—	Yes	Yes	Yes	Yes
No, may also be modified using DBF or dIF files.	—	Yes	Yes	Yes	Yes

					System
Encryption	Relations	Validity tests	Error or prompting messages	Multiple views of database	Maximum No. Record Types per Database
No	Yes, at command level.	Yes	Yes, broad range of error and prompting messages.	Yes, easily constructed from query language.	Unlimited
Programmable	Programmable	Programmable. System will automatically validate field type.	Programmable	Programmable	1 is default; can be increased with programming.
No	Yes, via reports and programming.	Yes	On screens only	Yes	5 files accessible from a single report
No	Can specify one-to-one, one-to-many, and many-to-many relationships. Relations can be virtual.	Yes	Not within data definition phase	No	Unlimited
Yes	Yes	Yes	Yes	Yes	10 files open simultaneously
No	Yes	Yes	On screens only	Yes	9 files open simultaneously

Specifications					Error Handling
Maximum No. Fields per Record	Maximum Record Size	Maximum No. Records per File	Maximum No. Records per Database	Maximum Field Size	
127	1,024 bytes	32,767	32,767	127 bytes	Field-by-field
32	1,000 bytes	65,535	65,535	254 bytes	Field-by-field
999	2,500 bytes	32,000	Limited by disk space.	50 bytes	Field-by-field
Limited by disk space.	Limited by disk space.	65,533	Limited by disk space.	1,023 bytes	Field-by-field
50	12,750 bytes	Limited by disk space.	Limited by disk space.	255 bytes	Field-by-field
891	3,000 bytes	65,534	Limited by disk space.	255 bytes	Field-by-field

Data Types and Maximum Sizes

Character	Numeric				Date
	Integer	Floating point	Money or dollars	Other numeric	
127 bytes	10 digits	No	10 digits	No	MM/DD/YY, DD/MM/YY, or YY/MM/DD
254 bytes	10 digits	No	Decimals handled automatically. Dollar signs must be programmed.	No	Programmable. A system date may be accessed.
50 bytes	14 digits	14 digits	14 digits	Incremental count for numbering records.	Yes
1,023 bytes	Range: ±32,768	32 digits	32 digits	Fixed-point decimal, scientific notation.	Yes; full date arithmetic available.
255 bytes	14 digits	14 digits	14 digits	No	Yes, can be input in any form; 10 output formats.
80 bytes	17 digits	16 digits	No	No	MM/DD/YY

Types/Sizes (cont'd)		Demo Version			Data Importing
Time	Logical	Available?	Cost	Limitations	
No	No	Yes	\$45	50-record limit	5 ASCII formats
Programmable	Yes	Yes, but only as part of system.	—	15-record limit	SDF
No	Yes	Yes	\$49, credited to purchase.	25-record limit	Comma-delimited format
No	Yes	Yes	\$50	50-record limit	SDF format. Also programmable through high-level language interfaces.
No	Programmable	No	—	—	Programmable; you can use system's Micro-English subsystem or a custom forms program to build sequential file.
No	No	Yes	\$5	25-record limit	DIF, dBASE II, DBF. Also via programming.

Data Exporting	Advanced Features				
	Back-up-ability/ Copy Protection	Audit Trails		Data Restructuring	
		Pre/post imaging	Activity or transaction log	Technique (inherent/ separate program)	Adding or changing indexes
5 ASCII formats	Copy protected; can back up files with internal commands.	No	No	Inherent	Yes
SDF	Not copy protected	Programmable	Yes	Inherent	Up to 7 index files may be open at once through the use of commands.
Comma- delimited format; also programmable.	Not copy protected	Programmable	Programmable	Inherent	Yes
SDF; also programmable.	Not copy protected	No	No	Separate; data schema can be changed with supplied utility program.	Yes, with same utility.
Special format: BUILD TEXT FILE clause places fields in a CP/M or PC- DOS sequential file.	Not copy protected	Yes	Yes	Inherent	Yes
DIF	Not copy protected	Programmable	Programmable	Inherent	Yes

Features (cont'd)		Report Generation			
Linked or Multiple Update of Indexes and Files	High-level Language &/or Product Interface	Capabilities			
		Sorting	Aggregates (min., max., count, avg., percent, etc.)	Arithmetic (*, /, +, -)	Parameter passing
Yes	Yes, interfaces to several languages.	Up to 32 sort fields	Yes	Yes	Yes
Yes	Yes, to many programs. Exported files may be accessed by any MS-DOS-compatible language.	Index key can be a combination of fields, subject to a limit of 100 characters.	Programmable	Yes	Yes
Programmable	Yes, BASIC.	Up to 10 sort fields	Yes, through report calculation.	Yes	Yes
No	Yes; Pascal, BASIC compiler or Interpreter, Macro Assembler and FORTRAN.	Any number of fields can be keys.	Yes	Yes	No
Yes	Yes, both. However, product interface is on paper, not on disk. But documentation provides all steps and code.	Up to 15 sort fields	Summaries only	Yes	Yes
Yes	Yes, with Day One application packages.	Up to 10 sort fields	Programmable	Yes, also exponentiation.	Yes

		Query Language			
Flexibility of output	Multifile access	Mass additions, deletions & updates	Load and unload	Execute stored scripts	Quality of output
Good	Yes	Yes	Yes	Yes	Excellent
Extremely flexible	Programmable	Yes	Yes	Yes. This is the real power of the program and the basis of its programming capability.	Excellent for experienced users
Quite flexible	Yes, up to 5 files per report.	No	Yes	Yes	Good, though creating custom report forms is cumbersome.
Good	Yes	Yes	Yes	Yes	Good
Not the system's strong point	Yes	No	Yes	Yes	Excellent
Very flexible	Yes, up to 9 files per report.	No	Yes	Yes, custom menus and reports.	Good

Report Generation (cont'd)					Procedural Language
Query (cont'd)	Report Formatter/ Generator	Screen Dumps	Other	Built-in Applications or Examples	
Other					
Tabulation, statistics, and limited report writing.	Yes	Yes	No	No	Yes, but no loop commands.
No	More exotic formats require programming.	Yes	No	Yes	Yes
Can use MAG/ base III data manipulation language in conjunction with BASiC programs.	Yes	No	No	Yes, sample real estate and customer files.	True procedural processing requires knowledge of BASIC, but menus provide access to most single-file functions.
No	Yes	No	No	No	No dedicated procedural language but uses various high-level programming languages.
No	Yes	No	No	Yes	Yes
Multifile browse	Both simple and complex formats available.	No	No	Yes	Prompted features provide procedural-language functions.

Performance Measurements

Time to Enter Standard Info.	Time to Execute Standard Task	Time to Perform Sort	Time to Extract Random Records	Size of Database Created	
				Number of records in employee file	Space compression
20 minutes	6 minutes, 50 seconds.	3 minutes	1 minute	500	No
30 minutes to write dBASE II programs, DOS batch files, and define dBASE II files. 1 minute, 30 seconds to automatically import data for all 3 files.	1 minute	2 minutes, 4 seconds with SORT.	1 second, using index.	500	No
About 1 hour, imported.	About 1 hour	12 minutes, 30 seconds.	2 seconds, using index.	500	Yes
2 hours, 13 minutes, imported.	About 15 minutes	25 minutes	Varies based on number of relations accessed and method of access.	500	No
Limited by typing speed plus 3 seconds update time between records.	About 15 minutes	Not an independent function	About 2 seconds	25	No
2 hours to import SDF files through dBASE II.	30 minutes to set up, but did not obtain satisfactory output.	12 minutes, 30 seconds.	About 2 seconds, using index.	500	Yes

Performance Measurements (cont'd)					Hardware/
Size (cont'd)	Number & Size of Ancillary Files	Degradation with Additional Indexes	Time to Create a Standard Report to Screen	Time to Execute a Standard Report to Screen	Minimum Configuration Required
Variable length of fields					
No	3 files with total of 1,015 records.	Minimal	2 minutes	1 minute	64K, 2 drives, DOS 1.1.
No	2 files, 640 and 680 records.	Slight at low volume levels, more significant at higher volume levels.	4 minutes	1 minute, 17 seconds.	128K, 2 drives, DOS 1.1.
No	1 per index; size dependent on key size.	Minimal	About 1 hour	1 minute for a single file, about 1 hour for a complex report.	128K, 2 drives, DOS 1.1.
Yes	None created.	Minimal	30 minutes after Report Editor had been learned.	25 to 40 minutes to sort, prior to commencement of printing.	128K, 1 drive, DOS 1.0.
Yes	Several created.	None	1 minute	2 minutes, 16 seconds for 14 records.	128K, 2 drives, DOS 1.0.
No	3 per database, requiring 7 percent additional space.	Minimal	30 minutes to 1 hour	About 1 second per record	128K, 1 drive, DOS 1.0.

Software	Subjective Evaluations				
Configuration Used in Testing	Documentation	Program Robustness	Flexibility/ Ease of Use	Would You Buy This One?	Would You Accept It as a Gift?
PC-XT with 512K, AST BOARD with Superdrive RAMdisk.	Excellent; lucid and full of examples.	Excellent	Very flexible and easy to use	Yes	Yes
640K, 10MB hard disk, DOS 2.0.	Well written but does not adequately present the great power of the system to the user.	Excellent	User must gain experience with product. New on- disk tutorial and sample programs help, but becoming a high-level user requires commitment.	Yes	Absolutely
384K, 2 drives, DOS 2.0.	Complete, but not especially easy for novices.	Good	Most satisfactory if you already have programs and data in BASIC format.	I would consider it if I required a programmable interface to other programs and data in BASIC.	Yes; has useful examples of BASIC file management and data manipulation techniques.
640K, 2 drives plus hard disk, DOS 2.0.	Fair but dry and technical. Oriented to experienced user. Too few examples in advanced areas.	Reasonably solid	Fair. Query language less intuitive than some, and requires strict, artificial constructions. Real power of system is available only to programmers.	Only if I needed a database that could access a high-level language.	Yes, if I needed a database that could access a high-level language.
Compaq, 512K, 2 drives, DOS 2.0.	What's there is good, but it's insufficient.	Good	Very flexible, not easy to learn.	No, I don't need a multiuser on- line environment.	No
384K, 2 drives, DOS 2.0.	Well presented, but not specific to PC- DOS.	Good	Good for nontechnical users needing custom reports. Cumbersome for experienced users.	Would consider it for multifile requirements.	Yes

(MAG/base III continued)

MAG/base III has standard screens that are attractive enough, but they do not simulate most paper forms, since the data are simply presented in two columns—the first column is one field per line, the second is the list of numbered field names. This kind of standard formatting works quite well, however, with the quick-report

MAG/base III has standard screens that are attractive, but they do not simulate most paper forms, since the data are presented in two columns.

or "list" function. This function allows you to print all fields and records, or selected ones; the program prompts you for selected fields and index key ranges by name. The system automatically provides column headings for the report, which you can either print or direct to the screen. It arrives on the screen in a steady "roll," or, if you choose, one screenfull at a time. Although record selection in this list mode is limited to a single index key (which can include several fields, such as state, last name, then first name), it makes for very easy report generation.

Generating more complex reports and custom forms or form letters is a comparatively cumbersome operation. You must first create them with a text editor and then compile them. For users who don't have a program editor, MAG supplies an elementary one. It uses control keys for cursor movement as does *WordStar*, but you can work only with single lines of text. (Each previous line vanishes from sight once you press the Enter key.) The format of a report specification is rather cryptic: you

use two-letter abbreviations for functions and numbers to designate files and fields. Nonetheless, it turns out to be quite flexible; reports can draw from up to five files by index key. Setting up or modifying these reports, though, is not a job you would want to undertake casually.

Another PC test was to import several hundred records of data from three standard files. Since MAG/base III stores its own data in what is known as a comma-delimited ASCII file (also used by most versions of BASIC) and since this format was one of those in which the test data was available, I anticipated that bringing it into MAG/base III would be a snap. It was easy to create a blank personnel file in MAG/base III, and all that remained, I thought, was to give the data file to be imported a filename ending in .DAT. Next I instructed MAG/base III to create indexes for the file, which it appeared to do nicely. After the program pronounced its work at an end, however, the resulting index files were hopelessly garbled. My guess was that MAG/base III's measure of the files' record lengths did not match my specifications, so it had shifted data from one record or field to another. After several hours of tinkering to no avail with the program's internal data specification file (which is, fortunately, well documented and can be edited by programmers), I decided to change the data file type to an "extended" version, that is, a file with fixed-length fields. The technical documentation luckily confirmed my hope that I could do so simply by changing one character and some record lengths in the data specification file. I then renamed my fixed length "system data format" file to correspond with the name of my previous MAG/base III file, re-entered MAG/base III, and, with bated breath, watched as the index creation routine worked over the new file. This time, to my relief, the program agreed that the file had 500 records and proceeded to index them all correctly. For all intents, records adopted by MAG/base III in this fashion then behaved like records created by the system, while still

remaining unchanged from their original format. In many applications, especially working with data files from mainframe systems, this method could be particularly valuable.

Life as a pioneer in the software business is not easy. A company like MAG with a fairly successful first-generation product cannot afford to rest on its laurels. MAG/base III is easy to use, but it could benefit from some reworking to provide access to function keys, a bit more error-trapping so that a user is never thrown out of the program even if a disk drive is unoccupied, and a better set of examples or tutorials demonstrating the more advanced functions of MAG/base III, such as multi-file reports. Even in its current form, however, MAG/base III may well be a good choice for organizations that use accounting software or other programs written in BASIC and that would like to be able to obtain custom reports or otherwise work with data through a sophisticated indexing system. BASIC may no longer be the language of choice for new systems develop-

MAG/base III may well be a good choice for organizations that use accounting software or other programs written in BASIC.

ment, but the amount of data stored in BASIC-compatible formats is vast. MAG/base III offers new and powerful ways of manipulating this data with relatively little time and effort. Particularly for BASIC users with some technical expertise, MAG/base III is a system well worth investigating.—Don Layman

RL-1 DATA BASE: For Professional Programmers

EMPL_NUM	DOMAIN=STRING 6 FORMAT=L6 TITLE="EMPLOYEE NUMBER"	KEYED=YES EDIT=YES
CUR_SALARY	DOMAIN=DECIMAL 9.2 FORMAT=P\$ZZZ,ZZ9.99 TITLE="CURRENT SALARY"	KEYED=YES EDIT=YES
AMT_CHANGE	DOMAIN=DECIMAL 9.2 FORMAT=P\$ZZZ,ZZ9.99 TITLE="AMOUNT SALARY CHANGE"	KEYED=NO EDIT=YES
DATE_CHANGE	DOMAIN=DATE FORMAT=DMM/DD/YY TITLE="DATE SALARY CHANGE"	KEYED=NO EDIT=YES
PERCENT_INCR	DOMAIN=DECIMAL 4.1 FORMAT=F4.1 TITLE="PER CENT SALARY CHANGE"	KEYED=NO EDIT=YES

The salary relation's field definitions as displayed by RL-1.

ABW Corporation's *RL-1 DATA BASE* is a powerful and flexible relational database management program with several unique features that make it suitable for high-level application development. Clearly not designed for beginners and nonprogrammers, *RL-1* offers an impressive spectrum of features. Its main claim to fame is a remarkably flexible high-level language interface that makes it possible for programmers to access the full range of *RL-1* features from several common high-level languages. However, as in most complicated systems, other areas pay the price for the most powerful features.

Unlike many database managers that

RL-1 DATA BASE

ABW Corporation
P.O. Box 1047
Ann Arbor, MI 48106
(313) 663-3011
List Price: \$495

Description: Relational
Requires: 128K RAM, 1 drive, DOS
1.0 or 2.0.

Records per File: 65,535

CIRCLE 759 ON READER SERVICE CARD

merely claim to be "relational," *RL-1* is a true relational system. Not only can you set up the standard tabular relationships, but you can implement complex virtual relations and normalized data structures as well. The program is capable of handling one-to-one, one-to-many and many-to-many data structures.

The system uses a memory-resident module that must be loaded before any functions will work. This module occupies slightly over 100K of RAM and evidently sets up a 40K "dynamic memory" for buffers. The *RL-1* module does not seem to interfere with any normal DOS programs, so it can be left resident while other programs are run (assuming the system has enough RAM).

Data Manipulation Language

Once the *RL-1* module is loaded, you can run several utility programs. The first usually would be DML, the package's data manipulation language. DML includes provisions for defining relations, editing these definitions, loading and unloading data from "flat" (nonrelational) files (presumably from other language systems), listing the characteristics of a

relation, selecting pieces of information from a database, updating information in a relation, and deleting records.

You can define a relation interactively from within DML, but this method is awkward and error-prone. It's better to use an outside text editor or word processor to define the data schema. Each field (called an attribute by *RL-1*) must be assigned a "domain," which would be called a data type by most other products. Available data types include integer, fixed-position decimal, floating-point real, string, date, duration (for date calculations), and logical. You can designate any field as an index key. A format can be specified for each field using an excellent selection of format strings similar to those in COBOL. The Edit characteristic determines whether the data in a field can be altered after creation, and a Title can be assigned to a field for use in report generation.

After defining the three PC test files, I began loading the data into *RL-1*. The LOAD command offers two options for importing data, a fixed-position method suitable for SDF and CBASIC files, and a free format that does not depend on keeping the foreign data in a fixed location within a line. *RL-1* successfully loaded the PC PERSON.SDF test file using the fixed-position method, but it took 1 hour and 9 minutes to do so! This time seemed particularly excessive since I was using a fast Tallgrass 35-megabyte hard disk. A glutton for punishment, I set up a RAM-disk and repeated the fixed-position load operation. With the RAMdisk, it still took 57 minutes, so the delay seems intrinsic to *RL-1*'s operation.

The free-form method fared no better. *RL-1* requires a nonstandard data format of quoted string fields separated by spaces, of which each line ends with a CR/LF pair. I converted the PC files to the format with a word processor. A three-record test file worked fine, showing that *RL-1*'s free-form method works, but 2 hours later (on RAMdisk!) the PERSON file had not yet been completely loaded. At this point, I gave up. *RL-1*, incidentally, displays

absolutely no messages of any kind to indicate the progress (or lack of same) in the loading process.

In fairness to ABW, a new release, Version 1.31, is now available, and the company claims it is several times faster than the one I was able to test. A "ten times faster" version is promised. This added speed is sorely needed. ABW also included several other enhancements in the new releases.

I encountered a few other surprises in loading the test files. The fixed positions start at 0, rather than at 1 as the manual indicates. Date fields have to be edited to include zeros rather than blank spaces or *RL-1* will indicate a "date conversion error" on the screen. *RL-1* supplied a non-sensical date value of 09/14/27 for all empty date fields (the programmer's date of birth, perhaps?). However, once I put everything into the exact form *RL-1* wanted, the data importation proceeded without hitch.

Query Language

DML includes commands that form a query language for accessing the information stored in the database. The SELECT command has such clauses as FROM to indicate the data source, WHERE to specify selection criteria (which can be complex), ORDERED BY to indicate sorted orders (which can involve more than one field), JOINED WITH . . . OVER to combine fields from more than one relation, GROUPED BY to specify aggregates, and CREATE to send the results to a new relation. You use the UPDATE command to modify data already in a relation, as, for example, when adding 10 percent to all stored costs. The DELETE command removes unwanted records.

The various DML commands can be used in tandem to specify reasonably complex data retrieval patterns. For example, the command SELECT LAST_NAME, EMPL_NUM FROM PERSON ORDERED BY LAST_NAME TO LPT1 is all that's needed to produce a report of last names and employee numbers in last-



name order. *RL-1* formats such output in nice boxes but provides no pagination or other prettification. *RL-1* took more than 25 minutes to sort the 500-record PC test file before it began printing the output.

My overall impression of *RL-1*'s query provisions is mixed. While you can define meaningful inquiries, the number of commands provided is limited, and their syntax is more restrictive and confusing than those of many query languages I have used. However, even though the query language is not one of *RL-1*'s strong suits, you don't use it to build serious applications, so its limitations are not as serious as they could have been.

You would normally use a separate program known as REDIT (for relational editor) to input and maintain data. It is a nicely done full-screen editor that displays one record at a time. You use cursor control and function keys to move from field to field and to other records. REDIT includes a FIND command to locate records based on a field that has been keyed and a SEARCH command to access records by unindexed fields. REDIT is simple, fast, and easy to use.

Assuming the simple output produced by DML is inadequate for serious reports, ABW has included an unusual full-screen report editor, RPE. RPE looks like a spreadsheet and uses a similar metaphor for defining reports. You use function keys to "paint" the report layout on the screen. Specific keys are active only in certain circumstances and then appear highlighted in the command area.

RPE is flexible in other areas as well. For example, you can print fields at the beginning or end of a report, a page, or a

group (when the value of a field changes). An interesting provision allows you to specify the detail level for a field from 0 to 9. Every record of the input relation is printed in order of the detail level.

Once you have defined the report with RPE, you produce it with the RPG (report generator) module, using the predefined report layout. RPG allows you to identify selection criteria, groupings, and sort orders and to specify which relation to extract data from. You can run RPG interactively or create text files with the appropriate responses.

High-level Language Interface

RL-1 has one of the most powerful interface mechanisms to high-level languages I have seen. Programmers can access the core, or kernel, of *RL-1* with various languages to make use of the complete facilities of a sophisticated database manager. You can use all *RL-1* capabilities while working in the IBM dialects of macro assembly language, interactive interpreted BASIC, compiled BASIC, FORTRAN, COBOL and Pascal.

The interface method uses assembly language calls to the *RL-1* kernel. ABW supplies all the library modules to link your program with a compiler and a special binary file to load into memory with the BASIC interpreter. Although using assembly language calls from high-level languages can be intimidating, *RL-1* makes the access procedure itself straightforward and simple.

Actually using the interface, however, is far from simple. The interface defines 43 functions to access *RL-1* and the data stored in relations, each of which has its own rules for parameters that you must specify, codes that it returns to the high-level program from *RL-1*, and other matters that you must attend to. Many operations that seem simple and transparent when using *RL-1* itself become multiple-function-call chores when done by a high-level language program. Some of this complexity is caused by the User Work Area (UWA), a buffer area that stores data

to be sent to or retrieved from the relation. Data must often be converted from one form to another in moving into or out of the UWA, which requires extra steps.

Individually, the interface processes and functions are within the capabilities of serious programmers. Others will almost assuredly be in over their heads with the interface, but this part of *RL-1* is not intended for them. Even a good programmer, however, will have to spend quite a bit of time learning the ropes before making anything happen, much less tapping *RL-1*'s full power. Learning to use the high-level interface is an undertaking that you'd only do if developing a major application package. ABW itself offers accounting and other business software programmed using *RL-1*, so the system is certainly capable of significant complexity.

Future Enhancements

ABW says that Version 1.31 of *RL-1* employs a menu-driven and screen-oriented data definition language to define relations. On-line help is also included.

A new relational editor called RDT is used for inputting and updating data. This new utility is also easier to use than the current editor, ABW says. It is evidently modeled on the RPE report editor.

The most important enhancement is in speed. The performance of my review version of *RL-1* in accessing, sorting, and retrieving data would hardly qualify for the Indianapolis 500, so this improvement is welcome.

I believe *RL-1* has much to offer those interested in serious application development. While the basic program is not as easy to use nor as flexible as some competitive products (at least for beginning and intermediate users), it can be a major timesaver for the advanced professional programmer. Once you make the initial investment in learning the system, you can create powerful data management applications in the high-level language and *RL-1* combination at small cost. If you are a good high-level programmer, *RL-1* deserves your consideration.—Glenn Hart

OPTIMUM: Not for End Users

DEFINE (7,038 IBM PC) Definitions: \$SALARY (NEW File)
Model: Command (Unused: Field=44 XR Field=2 L-Lookups=10 K-Lookups=2)

-----Add/Change Controls-----
| ESC - Exit Add/Change RETURN - Next Column or Option |
| ^H - Erase Character TAB - Continue 'Input Options' |
| ^X - Erase Entire Field space - Delete an Input Option |

No	Field Name	Input Options	Output Format	R	X	V
0	RECORD.NO		L4			N N A
1	EMPLOYEE.NO	XD, \$EMPLOYEE, LAST, NAME	L20			N N A
2	SALARY		V#####.##			N N A
3	CHG.AMT		V#####.##			N N A
4	CHG.DATE	DF, CURRENT, DATE				N N A
5	CHG.PERCENT	I	D/2			N N A
6			V##.##			N N A
>						

OPTIMUM's definition screen for the SALARY file.

With any programming task, there is a trade-off between power and ease of use. The same is true of the various database management systems on the market. At the lowest level, you code a system almost from scratch using some form of programming language. You can develop all kinds of customized applications, but you are given very little assistance in the way of tools that can simplify the process. At the other extreme are systems that are better known as file managers. All the programming code is there, and it's simple to use, but there is little or no flexibility.

Picking the system you need is not too difficult—the trade-offs are clear. If you have a simple need and a single flat file to keep track of, a high-level language may satisfy 95 percent of your requirements. If you have complex files to manage, you

may have no alternative but to select a system with a lower-level language.

OPTIMUM fits into the latter of these extremes. It provides a low-level language for the development of sophisticated, unique database applications. (Be aware that an executive-type utility that helps you create simple database systems with OPTIMUM is also available—we'll discuss this later.)

Uveon Goes to Market

OPTIMUM was developed by people with data processing experience on large, powerful systems. Uveon is a 3-year-old company, and OPTIMUM is its only product. The system was initially developed for applications normally handled by minicomputers. From November 1981 to April 1983, Uveon sold only to systems houses developing multi-user on-line systems for vertical markets such as the food and beverage industry, but the immense success of *dBASE II* stimulated OPTIMUM's entry into the end-user market. The product sells for \$595 and is targeted to users who have a lot of information to get into a computer quickly in an on-line mode and for whom batch processing and reporting are not primary concerns. A new release of the system is due this summer, and Uveon also plans to offer high-level programming classes (à la *dBASE II*) at a

OPTIMUM

Uveon Computer Systems
300 S. Jackson, #250
Denver, CO 80209
(303) 831-7000
List Price: \$595

Description: Relational

Requires: 128K, 2 drives, DOS 1.0.

Records per File: Limited by disk space.

CIRCLE 793 ON READER SERVICE CARD

YOU DON'T
HAVE TO
REMODEL
TO ADD ON.



With some computers, the more you do, the more you have to add on.

A little memory expansion here. A graphics adapter there. Next thing you know, you need an expansion chassis. And a loan from the bank.

Corona builds memory expansion (up to 512K) and high-resolution graphics right into the main board. That saves you money. And expansion slots. Plus, our 128K standard memory and IBM® compatibility let you run thousands of software packages right out of the box. The net result is a PC that grows on you. Painlessly.

The Corona PCs.

It's a matter of simple addition.

In North America, call 1-800-621-6746 for the Authorized Corona Dealer near you. In Holland, call 020-03240-18111. There are over 1,600 dealers worldwide. And their job is to help. Service by Xerox.

corona
data systems, inc.

THE CORONA PC

©Corona Data Systems 1984

CIRCLE 216 ON READER SERVICE CARD

cost of \$250 for 2 days of training.

The components of *OPTIMUM* are as follows:

- The Terminal Control Language controls the environment in operating-system style. Subsystems—such as the Form Processing subsystem, user ID maintenance, and access protection facilities—are invoked through this language.
- The Define File utility is a simple applications development tool to specify file information, describe file contents, build files, create data entry/maintenance forms, and build simple report selection forms.
- The Form Processing system includes a form editor, form compiler, form print utility, and form processor.
- The Micro-ENGLISH Inquiry/Reporting Language is a utility that operates on *OPTIMUM* files and performs selective retrieval, sorting, and reporting through the use of dictionaries.
- The Micro-ENGLISH Sentence/Report Editor is the front end to the Micro-ENGLISH processor and allows the design of reports.
- The Item Editor is a utility that operates within files to create and edit items (fields).
- File utilities create, clear, and inspect *OPTIMUM* files.

The package includes two disks. One is an *OPTIMUM* systems disk, the other, an *OPTIMUM* data disk. These disks came configured and ready to run on an IBM PC. The files were accessible through the normal PC-DOS commands and utilities. The disks were copyable using the DISK-COPY command. The system is also available on a variety of other computers operating under CPM.

Struggling with the Manuals

Two manuals came with the system: the *Executive Series User's Guide* and the *Professional Series Programmer's Guide*. The manuals are vastly different, as they should be. The two-color *User's Guide* is designed for nontechnical eyes—it is nicely put together and is as understand-

able as a system with *OPTIMUM*'s complexity can be.

At the end of the manual, after the appendix, glossary, and index, is an "Applications Notebook," which takes an application (in this case, an order processing system) and develops it step by step in the documentation. The notebook is a super idea; unfortunately, its 184 pages



The Notebook is a super idea; unfortunately, its 184 pages are written in a language that's undecipherable to the average user.

are written in a language that's undecipherable to the average user. The sample system is more sophisticated than anything you can build with the Define utility, which is all you learn to use from the *User's Guide*. The "Applications Notebook" uses the Define utility to start out and then plunges you into the real systems tools such as performing interfile validation, using the cross-reference features, and optimizing code. In our opinion these tools are appropriate only for advanced computer users and systems developers.

Even though the *User's Guide* is great at getting a novice into a complicated sys-

tem (we managed to define the benchmark database file with its help), you can't do anything sophisticated with the knowledge acquired in this manual. What all this boils down to is that you can use the Define utility described in the *User's Guide* to create very basic flat file applications. But if this is all you want to do, there are certainly better systems on the market.

File Definition

To define a file, you first define its fields, specifying each field number, name, input options, output format, and which fields are to be cross-referenced with other files. *OPTIMUM* then asks you for an estimate of how many items will be stored in the file, whether you want the system to create a data entry form, and whether you wish to lock the records so that only one person can access them at once. *OPTIMUM* also asks if you want the system to create a print form and if you want to define video attributes.

The system then creates a dictionary for the file, updates the dictionary with the field names in the file, creates the main data file, creates a cross-reference file, builds the print form, and builds the data entry form. The filename is then added to the Function Display menu, and the file is ready for you to use.

While defining a 500-record EMPLOYEE file in this manner, we discovered that (although the documentation says nothing about it) *OPTIMUM* is not a traditional micro-floppy system. For all practical purposes, a hard disk or 8-inch drive configuration is required. We discovered this only by actually putting up the benchmark system using 5¼-inch floppies. The system stopped as it was creating the cross-reference file and issued the following message:

```
KDAM-86: CB86 Direct I/O  
Error!
```

We scurried to the *User's Guide* and found the following:

OPTIMUM KDAM error messages are fatal to the executing program. Some



We deliver the information age to you ...

...today, within reach of your telephone, there are information utilities with almost any data you could ask for.

If you have Crosstalk and a modem, you have what it takes to hook almost any business microcomputer into this incredible information network.

The most widely used communications program available, Crosstalk helps your computer transfer data to and from other microcomputers, dial-up mainframes, and information data bases that provide data to the public.

CROSSTALK

TM

You can gather the world's latest news, look over the most recent hourly stock prices, check an airline schedule and make a reservation, get the recipe for Chicken Kiev, find out the weather forecast for Paris or Peoria, do research on the wines of Bordeaux, or answer complex legal questions.

Almost anything you need to know is now within your reach.

Crosstalk is available for most small business computers including IBM, Victor, Texas Instruments and DEC. See your nearest computer retail store, or write for the details.



Microstuf, Inc.
1845 The Exchange
Suite 140
Atlanta, GA 30339
(404) 952-0267

Crosstalk is a Trademark of Microsoft, Inc.
The Source is a Trademark of Source Telecomputing Co.
CompuServe is a Trademark of H&R Black.
IBM is a Trademark of IBM, Inc.
Victor is a Trademark of Victor Technologies.
Texas Instruments is a Trademark of Texas Instruments.
DEC is a Trademark of Digital Equipment Corp.

```
!SELECT  
OPTIMUM SELECT (7,038 IBM PC) - (C)1983 Uveon, Inc.  
-->EMPLOYEE  
--BY ZIP, CODE  
--DISPLAY LAST, NAME FIRST, NAME DEPT, REC SALARY, REC  
--HOLD  
-->
```

The **OPTIMUM** query language is used to sort and display the employee file.

indicate severe error conditions, while others indicate operational errors. Egads! There were no other clues. We turned to the Programmer's Guide and found the same obtuse explanation. After recreating the data diskette and redefining the **EMPLOYEE** file, following the instructions carefully, we obtained the phantom error message again. We called our contact at Uveon, who said, "Your diskette is full." Okay, back to the drawing board. We redefined the **EMPLOYEE** file, allocating space for 200 records. All was well so far. We then defined the **DEPTHIST** (department history) file, allowing for 50 records. Finally, we defined the **SALARY** file, also allowing for 50 records. Oh no! Another error message. The long and short of it was that **OPTIMUM** needs a hard disk to work with a respectable number of files.

(Incidentally, Uveon provided to us, for the benchmark problem, a program that would enable us to import the three **SEQ** data files—500 employee records, 640 department records, and 680 salary records—directly into our defined **OPTIMUM** files. But to use this program a hard disk is required, because a floppy system does not provide enough space for it.)

Updating and Reporting

Back at the main menu we decided to select the employee form and add some employees to the file. The ID or key field (in this case, the Employee Number field) was set apart from the rest of the record—the data entry form for the **EMPLOYEE** file was the one generated in the Define utility. We added three records to the file, using the ID, and then requested one of the three records by "key word" (the last

name, in this case). We picked a last name common to two of the three employees and were immediately supplied with information for both records showing the IDs from which we could choose. It was about this time that we were beginning to like the system.

According to the folks at Uveon, **OPTIMUM** was designed for an on-line multi-user environment. The company would like its product to be the **dBASE II** of this unique environment. The on-line multi-user emphasis is apparent. We were asked in our file definitions how to handle

OPTIMUM has the potential to be a very good system, but the PC version has a long way to go before it will work for less persistent users.

multiple accesses to the same record, and we were able to rapidly and conveniently add records to a file and retrieve specific records quickly.

What about the remainder of the benchmark? We knew almost from the beginning that it would not be completed. A Uveon representative predicted that it would take us 2 weeks to put the application together. Since we had already been told that the batch processing was not **OPTIMUM**'s strong point, we felt that we

were not doing the system a great injustice by not completing the problem. We briefly tested the batch capabilities with a three-record file and discovered that they were quite slow. To generate a screen report it took 3 minutes and 16 seconds to make the menu selections and wait for **OPTIMUM** to select, sort, and display the records. When the same report is produced on the printer, there are headings and formatting, including page numbers.

When adding records to the department history file we created, we were given a choice between entering either the Employee Number or key words to get a record. This enabled us to enter the employee number if we knew it or the employee's last name if we didn't. This option was available because when we defined the file, we specified an Interfile option that allows us to do a search in another file with cross-referenced key words.

OPTIMUM's Terminal Control Language and Micro-ENGLISH together made it easy to sort the **EMPLOYEE** file by any field we chose and to display selected fields from the sorted records in a report format.

We briefly ventured into **SELECT-ED**, the Micro-ENGLISH editor, for true report-writing and found a complex subsystem that includes fairly comprehensive text-editing capabilities and a preformatted report layout. **SELECT-ED** was so complicated that it didn't seem to be worth the trouble. But it's difficult to judge how useful a facility like **SELECT-ED** would be once a user got accustomed to it.

An Uphill Battle

OPTIMUM is potentially a very good system. It is not for everyone, and the IBM PC version of **OPTIMUM** has a long way to go before it will work for any but the most persistent user.

Would we use **OPTIMUM**? It's hard to say. This system attempts to bring mini-computer database power to a microcomputer. The program was designed for a unique purpose: to provide an on-line,

BIG TIME STATISTICS GO SMALL



**Statpro™ brings
the power of
mainframe statistics to
your personal computer.**

Until now, serious statistical analysis meant mainframes, computer centers and a lot of extra work for you.

Enter Statpro, the most powerful statistical software system ever developed for personal computers.

It lets you do almost everything you do on a mainframe on your IBM® or Apple® personal computer. Including descriptive statistics, regression, ANOVA, factor and cluster analysis, to name just a few capabilities.

And Statpro's awesome power isn't limited to number crunching. You can plot all your results in four-color graphics, such as scatter, triangle and regression plots, dendrograms, histograms and pie charts.

What's more, Statpro has sophisticated database management capabilities which make entering, manipulating, transforming and editing data quick and easy.

Most important of all, you get this incredible power in one integrated, fully documented, easy-to-use package.

Statpro for personal computers. Another example of why small is beautiful.

Contact your local dealer. Or
Wadsworth Professional Software,
Inc., Statler Office
Building, 20 Park Plaza,
Boston, MA 02116.



800-322-2208
In Massachusetts call (617) 423-0420.

**Wadsworth
Professional Software**

Statpro is a trademark of Wadsworth Professional Software, Inc.Apple is a registered trademark of Apple Computer, Inc.IBM is a registered trademark of International Business Machines Corp.

KnowledgeMan: The software that keeps on growing... for people who just can't get enough of a good thing.

We help a lot of different people solve a lot of different problems: from the simplest to the most complex...from mailing lists to integrated accounting, from preparing

tax returns to order entry. Whether you need help saving money or making it, KnowledgeMan can help you manage your information better than any other micro software package.

Quality Software for Quality Results

You can start just as simply as you want and grow just as fast as you like. KnowledgeMan's powerful commands are always ready when you are. You get quick results, improved productivity, accurate information, custom tailored to meet your needs. KnowledgeMan lets you use your information, when you want it and in the way you want it.

Reliable and Comprehensive

KnowledgeMan is built to last. You can start with the Beginner's Guide, or run right through the instruction manual to advanced data management commands.

Chances are you won't find a job KnowledgeMan can't do.



Features*	Advantages*	Benefits*
Unlimited number of tables open at a given time	No need to open and close tables repeatedly	Speedier answers to your queries
Up to 255 fields per record	Greater descriptive capacity	Lowest frustration of having to deal with multiple tables for a single topic
Passwords, read/write access, data encryption	Access to data is individualized	Unauthorized use of data prevented
Query multiple tables with a single command	Retrieves data without unnecessary intermediate steps	Users get information more efficiently
Query syntax like IBM's SQL/DS	English-like commands	Users not required to learn a new language
Dynamic sorting and grouping of query output	Control of output format	Data can be customized to users needs
Spreadsheet cells may be defined in terms of <ul style="list-style-type: none"> * formulas * data table values * programs 	Cell can automatically retrieve information from tables and can perform intricate mathematical operations on that information	No need to rekey information or perform calculations separately
Forms painting for screen and printer using 8 colors, blinking, bell, prompts, reverse video, etc.	Greater versatility in screen and printed output	Screen and forms are easy to understand and use
Statistics (e.g., min, max, average, sum, standard deviation, variance, etc.) automatically generated	Provides more complete analytical description of data	Improved decision-making capabilities
Color graphics: pie charts, bar charts, area curves, scatter diagrams, etc.	Numerical data from spreadsheets and tables can be pictorialized	Patterns and trends easier to spot
Text processing	Customized documents (form letters, etc.) can be merged with data from tables, without leaving the system	Improved worker productivity

* Partial List

Operating Systems: PC DOS, MSDOS, CP/M-86. Minimum RAM required: 192K. Graphics text processing and forms painting are optional integrated KnowledgeMan components.

KNOWLEDGE man

The Knowledge Manager from MDBS.

Micro Data Base Systems, Inc.
P.O. Box 248, Lafayette, IN 47902
(317) 463-2581

KnowledgeMan is a trademark of Micro Data Base Systems, Inc.; CP/M-86 of Digital Research; SQL/DS and PC DOS of IBM; and MSDOS of Microsoft. Current release is 1.06 as of 4/1/84.

CIRCLE 525 ON READER SERVICE CARD



multi-user database management system for under \$1,000. In our attempt to establish if a niche does, in fact, exist for this product, we spoke to a new user of the system. This user had selected *OPTIMUM* as a front-end to a mainframe system to handle on-line inquiries and updates. He was impressed with the variable-length field and record capability, which increases efficiency in an environment with a large database. But our user contact, who is a data processing professional, expects to embark on a 6-month programming task with a team of programmers. In other words, this is definitely not an end-user system. Uveon's hope that *OPTIMUM* will compete with *DBASE II* is therefore misfounded. It will take a long time and lots of development dollars to bring *OPTIMUM* (especially in the batch processing area) up to *DBASE II*'s level. But how does *OPTIMUM* compete with more powerful packages that are downloaded from minis and mainframes to micros? Not very well. For instance, the only reason we can think of that anyone would pick this system over *FOCUS* (a very powerful program that will be reviewed in the next issue) is because *FOCUS* costs over twice as much as *OPTIMUM*. Yet the user who selects either of these systems will spend so much money on systems development that the initial cost of the package will probably be insignificant when compared to the total cost of the project.

In summary, *OPTIMUM* will appeal only to those who need to work on a multi-terminal, on-line environment that demands a lot of on-line updating and inquiry and lightning-fast record retrieval without a great deal of batch processing. *OPTIMUM* will continue to have its largest sales to OEMs and system integrators in vertical markets, with occasional sales to technically minded individuals looking for an inexpensive, powerful programming tool for database applications.

—Barbara E. McMullen and John F. McMullen

Day One: The Promise of Youth

060106 080105

-- SORT BY --

```
( 1) File #           00
( 2) Screen #        00
      Enter 0 to Find Name
( 3) Sequence #       00
( 4) Fieldname        .....
( 5) Type of SORT      0
      0=Ascending, NO Totals
      1=Ascending, w/Totals
      2=Descending, NO Totals
      3=Descending, w/Totals
```

A Day One menu is used to specify sort criteria.

For a new product to succeed in today's crowded data management software market, it has to offer something special. This might be ease of use, technical power and flexibility, security and reliability, conformity to existing standards, good marketing and support for dealers and purchasers, or price. The premier offering from Day One Software, Inc., is not breaking new ground with its price of \$695, but it has several interesting aspects. The *Day One* system shares both the promise and the growing pains of youth.

The development of *Day One* began about 1982, inspired in part by data management software then running on main-



Day One

Day One Software, Inc.
618 Shoemaker Rd., #201
King of Prussia, PA 19406
(215) 337-8255

List Price: \$695

Description: Relational

Requires: 128K RAM, one 360K drive
(two recommended).

Records per File: 65,534

CIRCLE 758 ON READER SERVICE CARD

frame computers and Hewlett-Packard minis. Several critical modules have been written in assembly language, with additional development taking place in compiled BASIC and, most recently, in C, particularly to prepare a UNIX version.

According to the developers, about a thousand copies of the program had been sold, mainly in the Philadelphia area, prior to national marketing in 1984. In a wise attempt to offset competition from major companies that sell their databases by mail

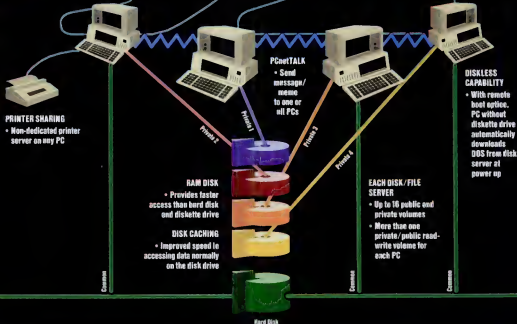
PCnet from Orchid Technology



The Most Advanced, Affordable Way to Transform Your Personal Computers into a Fully Integrated, High-Speed Local Area Network.

NEW SOFTWARE

PCnet SPEED IMPROVEMENT



PCnet is the lowest cost network for IBM® PCs. Take your choice.

\$495 per node when purchased as a stand-alone.

\$395 per node when purchased with BLOSSOM (384K RAM, Clock, IO)

Orchid, the creator of PCnet, has made high-performance local area networking affordable to all PC users. Contact your local dealer or Orchid today to unlock the

power of your IBM PC and find out more about our full line of products.

PCnet—Stand-alone Network Board

PCnetPlusRam™—PCnet + 256K RAM

PCnetBlossom™—PCnet + 384K RAM +

Serial Port + Parallel Port + Clock Calendar

Blossom™—New Generation Multifunction Board

PCturbo™—The Ultimate IBM PC productivity enhancement board

IBM PC is a registered trademark of International Business Machine Corporation.

PCnet, PCnetPlusRam, PCnetBlossom, Blossom and PCturbo are all trademarks of Orchid Technology.



ORCHID TECHNOLOGY

47790 Westinghouse Drive

Fremont, CA 94539

(415) 490-8586 Telex: 709289

order, Day One has designed some of the snazziest software packaging around. The developers are also working (mainly in-house, rather than with outside developers) to create derivative programs for mail lists, inventory management, medical offices, and other vertical applications.

A Smooth Start

If you need a database for relatively simple applications, it really is possible to do useful work with this program on day one. This is owing in part to a good, brief tutorial program that introduces database terms and concepts in a clear fashion and provides limited interaction in creating and using a new file.

Installing *Day One* requires that you specify both a "personal name code" and an ID number. It's best to keep these short and simple, because you must use them every time you enter the program, whether or not your application needs password protection (presumably as a measure to discourage software pirates). Once you pass this protective barrier, you arrive at the main menu, which is sensibly divided into setup functions, such as "Describe Your File," and corresponding "action" activities, like "Fill Your File."

All functions on the main menu can be selected by number, and if you need help, you can type HE at the command line, or—a currently undocumented feature—you can press the F1 key. The help offered is fairly context-sensitive. Choosing "Describe Your File," for example, brings up a submenu where pressing F1 will explain the options, which include not only defining new files, but also adding fields and rearranging screens for existing files (not an easy task in many systems).

There is a quick, semiautomatic way of creating specifications for new files, in addition to a more detailed method that can later be used for fine-tuning. The options here include validation criteria, screen number and position, and various other refinements that you might well want to make after giving the system an initial shakedown. Each file, record, and

other data element is actually a database specification record within *Day One*, so file modifications are much like editing an ordinary bit of data.

Full-screen editing is not available—you can't move easily from field to field using cursor keys (the company does expect to include this capability in a future edition).

There are a couple of oddities in the command structure that you will get used to only gradually, such as getting back to a command line by pressing the caret key (^), or breaking out of a routine by pressing Ctrl-E, neither of which is clarified on

Day One has designed some of the snazziest software around.

help screens or in the manual.

Despite these quirks, this program has impressive capabilities. Although I could not test all of *Day One*'s advanced features, the system is designed to handle up to 9 files in a single report, handle records with as many as 891 fields, store as many as 10 qualifying selection criteria for browsing, and produce many custom forms. Most output can be directed to either a printer or the screen, and reports can also be sent to a text or DIF spreadsheet file or can be used to create a separate *Day One* data file. All these functions are available by picking numbers from a menu and filling in blanks, giving *Day One* the functional equivalents of many features found in data management systems with true procedural languages.

File Conversion

When it came time to run the official test data for this series, it seemed we would have a problem. Currently, *Day One* does not read standard system data format (SDF) ASCII files from the outside world, although a conversion utility for

both these and for mainframe files in the EBCDIC character set is being tested at *Day One*. Fortunately, though, *Day One* does proclaim its capability to use not only *VisiCalc*-style DIF files but also files from *dBASE II*. Since *dBASE II* was able to read SDF files, I converted the data into *dBASE II*'s DBF files and then turned *Day One* loose on the problem.

The *Day One* DBF file converter is quite sophisticated; it allows you to specify changes in your file setup as you perform the conversion. It also allows you to specify index key fields, since it creates its own indexes in the process and appends them to the data file. Two of the *dBASE* files (those with the most records, but the shortest record structures) were read by *Day One* without a hitch. The third file was converted too, but the conversion module announced 50 records short of the end of the file that it had a "BASIC error 6 in Line 5875" and then permitted a graceful exit to the master menu.

This difficulty, along with some problems in creating multifile reports, obliged me to call the publisher's toll-free hotline. I was favorably impressed by the quality of advice, the company's willingness to ship an updated edition of the software, and the follow-up checks on whether my problems had been solved. Although some of the glitches remained, even in the new edition (fortunately quite compatible with my previous files), I was left with a sense that problem reports from any source would be taken seriously.

Day One is the sort of system I'd like to see succeed in its attempt to enhance and preserve the diversity of offerings in an era of heavily capitalized (and usually less daring) big names. *Day One* Software is trying to carve out a niche through dealers and with clients who need software tailored for vertical applications. Shoppers who have good local support and who need the power of a multifile data management system that doesn't require a high level of technical knowledge should consider putting *Day One* on their comparison-shopping list. —Don Layman

"T" FOR TWO.



BUY OUR NEW ELEPHANT™ RIBBONS AND GET AN ELEPHANT T-SHIRT FOR JUST \$2.00.

To introduce you to our new Elephant Memory Systems™ Ribbons, we're offering our unique Elephant T-shirt for just \$2. Send in your proof of purchase along with the attached coupon and \$2. We think you'll find our durable, high quality Ribbons will make your PC's printing look better than ever. And with our Elephant T-shirt, so will you. For the Elephant Ribbons dealer nearest you, call 1-800-343-8413. In Massachusetts, call collect (617) 769-8150.

Mail this coupon and \$2.00 (check or money order, payable to Dennison Computer Supplies, Inc.) plus proof of purchase of Elephant Memory Systems™ ribbons (serial number from the package and your cash register receipt with the purchase price circled).

To: Dennison Computer Supplies, Inc./T-Shirt Offer
320 Norwood Park South
Norwood, MA, 02062

Check size: ☐ small ☐ medium ☐ large ☐ x-large

Name _____ (Please print)

Address _____

City _____

ELEPHANT NEVER FORGETS

HARDWARE

ALFRED POOR

The Monroe 2000 and the Tandy TRS-80 Model 2000 offer high-speed computing based on the 80186 processor. But is the loss of PC-compatibility too high a price to pay?





Monroe & Tandy Strike Out On Their Own

Photograph: Lee Morillo

MONROE AND TANDY

The MS-DOS desktop computer market is getting crowded. Many manufacturers are content to let Big Blue clear a path for them and then proclaim "total compatibility" as their ticket to join the parade. As a result, though, they run the risk of getting lost in the crowd.

A few brave companies have decided on a different tack. They are attempting to explore strange new designs, to seek out new problems and new solutions for them, to boldly go where no computer company has gone before.

Tandy and Monroe are two such explorers. Leaving the trek toward PC compatibility to their more timid peers, they have instead focused on performance and other design features. What makes their decision so surprising is that both companies have conservative reputations to protect. Tandy (Radio Shack's corporate parent) helped get the microcomputer market off the ground with its TRS-80 Model 1, but it has rarely shown much interest in forefront design. Monroe, a big name in calculators and other office equip-



An inside look at the Monroe 2000 reveals its low-profile design, built-in fan, and two different sizes of connectors.

ment, has never been well known for its microcomputers.

Yet both firms, without riding IBM's long coattails, have created microcomputers aimed at the business market. Both have given their computers the name "2000." Both computers are based on the 80186 microprocessor, and both are geared for high performance. The question is whether they succeed well enough to justify choosing them over the "compatible crowd"? Since each machine has a character of its own, the best way to give a fair evaluation of them is to consider each one separately.

The Monroe 2000

The Monroe 2000 is designed for low-profile functionality. It has a built-in fan that is a bit noisy. There is a small reset switch on the back of the computer, but it is not labeled. I would have preferred to see it clearly marked to reduce the risk of someone pressing it "just to see what happens." Monroe deserves kudos, however, for showing that keyboard cables can be intelligently routed—the cable plugs into

a recessed spot in the front of the box.

The keyboard has 92 keys, arranged with ten "program" function keys along the top left edge, along with four more "user function" keys. The cursor-control keys are set off by themselves between the letter keys and the numeric keypad. The numeric keypad has the same key assignments as the IBM PC, including an additional set of cursor-control keys and a second Enter key. The typewriter portion of the keyboard is laid out like the IBM PC's, with a few exceptions. The left-hand Shift key and the notorious Backslash key have been switched, an improvement unless you are already acclimated to the PC version. The Return key is labeled as such. The CapsLock, NumLock, and Scroll Lock keys are lighted to show their status, but the lights impart a "clunky" feel to the keys, and they do not offer the same resistance and release as the rest of the keys do. The other keys have a slightly mushy feel, but their tactile feedback is adequate.

A standard Monroe 2000 comes with 128K RAM, but this can be boosted to as much as 896K (a full 256K more than the



Monroe 2000

Monroe Systems for Business
The American Road
Morris Plains, NJ 07950
(201) 993-2000

List Price: \$4,295 with two disk drives; \$6,095 with 10-megabyte hard disk. (Both versions include amber monitor.)

CIRCLE 751 ON READER SERVICE CARD

Tandy TRS-80 Model 2000

Tandy Corporation
1400 One Tandy Center
Fort Worth, TX 76102
(817) 390-3011

List Price: \$2,750 with two disk drives; \$4,250 with 10-megabyte hard disk.

CIRCLE 750 ON READER SERVICE CARD

IBM PC). The computer has 6 full-size expansion slots, as well as three short slots used by expansion options such as the Z-80 card. You can also add additional serial ports if you need them, although the standard configuration includes one parallel and two serial ports. One item you won't have to add is a clock/calendar card—it's already included.

The floppy disks are double-sided, double-density, with double the tracks (80 per side). As a result, disks hold a nominal 720K—712K after MS-DOS 2.0 formatting and 640K under CP/M-86. This gives you more than twice the storage space of an IBM PC floppy disk (354K under DOS 2.0).

The monitor comes with a pedestal base and has an acceptable character set. No demo programs were provided to test its graphics capabilities, but with a resolution of 690×400 , it should perform quite well. One nice surprise is that graphics capabilities come standard with the Monroe 2000, instead of as an option costing hundreds of dollars.

Operation

The first thing I noticed about the way the Monroe 2000 works is its speed, at least when it comes to calculations. When I ran the prime number program used in other computer tests at *PC Magazine* (listed in "A Garden of Portables," *PC*, Volume 3 Number 6), it rocketed through in only 25 seconds. This is one-third the time an IBM PC requires. It is also the fastest time I have ever encountered on an MS-DOS machine. The MAD-1, another 80186 machine, is 50 percent slower, at 38 seconds (see "A Sporty Compatible," *PC*, Volume 3 Number 14).

The Monroe 2000's speed comes, in part, from its 80186 chip, which is quite different from the 8088 processor used in the IBM PC and most of its clones. The 8088 has 16-bit internal registers, but can retrieve and send only through an 8-bit data bus. The 80186 is a "true 16-bit" processor in that both its internal and external buses are 16-bits wide. The

80186 is an improvement on the 8088 chip, since it has more commands in its instruction set, and it incorporates more electronic components in its design. As a result of this larger integration, an 80186

Graphics capabilities come standard with the Monroe 2000, instead of as an option costing hundreds of dollars.

design requires fewer supporting chips. All these factors help it run faster.

Good Design Features

Other aspects of the Monroe 2000 stand out as examples of good design. For example, the operations manual instructs you to leave the disk drives empty when you turn on the power. The computer goes through a quick self-check, and if all goes

well, the screen prompts you to insert a disk. Just to give the self-test something to do, I powered up with the keyboard unplugged. Not only did the computer recognize that something was wrong, it displayed a clear prompt on the screen explaining that something was wrong with the keyboard.

When prompted for the system disk, all you have to do is insert the disk and close the drive door—the operating system will load and you're ready to go. You cannot close the disk drive latch unless a disk is in the drive. This means that you can tell at a glance if a drive is empty—if the latch is down, there must be a disk in the drive.

The computer comes with two operating systems, MS-DOS and CP/M-86 DPX. According to Monroe, the "DPX" means that it can work with dual processors. An optional Z-80 board tacks onto the motherboard and allows you to run 8-bit CP/M-80 programs. With the CP/M-86 DPX operating system, you can run 8-bit and 16-bit CP/M software under the same operating system.

The manuals show good attention to detail. *The Guide to Operations* includes detailed set-up instructions, although it

Comparative Speed Test

Prime number test	Monroe 2000	IBM PC	Tandy TRS-80 Model 2000
Display on	0:25	1:07	2:13
Display off	0:06	0:17	0:07
Recalculate spreadsheet	0:04.3	0:19.5	0:05.1
Format disk	2:10	0:42	1:25
Load WordStar	0:07 (CP/M-86)	0:06 (PC-DOS)	Not available

1 A peek inside the Tandy TRS-80 Model 2000's white plastic cover exposes its metal foil lining, installed to reduce possible RF interference.

2 The Tandy TRS-80 Model 2000's motherboard is slung out of eight underneath the computer like a spare tire under a pickup truck. This effectively gets the board out of the way, but makes access extremely difficult.

3 Unhooking the bottom of the Tandy TRS-80 Model 2000's case affords a better view of the computer's motherboard. The author suggests leaving the removal and replacement of the motherboard to a trained technician.

also points out that "your Monroe representative will perform the initial set-up of your system." Under the installation section, Monroe gets more specific than any manual I have ever seen; it recommends placing the machine on a table with a surface area of at least 25 inches by 50 inches and capable of holding at least 50 pounds. It also recommends using a dedicated power line providing three-prong, grounded, 115-volt electricity, and "a low-static-electricity environment." Tutorials for MS-DOS and CP/M-86, a trouble-shooting guide, a glossary, and technical appendices with memory maps, port pinouts, and disk format details are also included with the Monroe 2000.

The Other Side

On the darker side, a number of details detract from the effectiveness of the Monroe 2000's design. Some are merely cosmetic, but others go deeper.

To start with, the machine reviewed was a hard disk version. The *Guide to*

Operations made no mention of how to work with a hard disk, so I had to search through the MS-DOS manual for help. Near the back of the book, I found a section that explained a few of the hard disk utilities. I tried using the HDPART utility to divide up the disk, but had problems when I tried to set the entire space aside for an MS-DOS partition. The computer kept telling me that it found only 8 megabytes of storage space available. I eventually discovered that specifying a second partition of 0 size made the entire 10 megabytes available in one partition.

Another utility was designed to convert IBM PC disks to the Monroe format. When I tried to run it (so that I could copy the benchmark program), the screen kept asking me to put the IBM format disk in the B: drive, and then it would tell me that it couldn't find the B: drive. Like the IBM PC-XT, the Monroe designates the floppy drive as the A: drive, and the hard disk is considered the C: drive. Unlike the XT, however, the Monroe considers the A:



drive to be the A: drive, no matter what. (The XT can reassign the floppy drive as drive B: if needed.) The IBM format conversion utility was evidently coded to always look for the B: drive, so I couldn't get it to run.

A Monroe spokesman informed me that the utility has been rewritten and that this problem has been fixed. Unfortunately, the revised version did not arrive in time for me to test it. This is a shame, because the utility sounds useful. Apparently, it prompts you to specify one of three formats for your IBM disk: 8-sector single-sided, 8-sector double-sided, or 9-sector double-sided. With the utility, you should be able to convert just about any DOS 1.1 or 2.x file into the Monroe 2000 format.

Disk operations are not particularly fast. The Monroe takes a long time to format a disk under MS-DOS. Although its disks are only twice the capacity of an IBM PC disk, it takes 2 minutes and 10 seconds to format a disk, which is more

than three times as long as the 42 seconds a PC requires. Under CP/M-86, it took 7 seconds to load *WordStar*, as opposed to 6 seconds for a PC under MS-DOS.

As evidenced by the prime number benchmark, the Monroe 2000 does calculate quickly. I also had it recalculate a spreadsheet with 100 rows in ten columns, where each cell is defined as 1.1 times the value to its left or above. The Monroe whizzed through this in just 4.3 seconds (using *SuperCalc*² under MS-DOS). In comparison, a standard IBM PC (using *VisiCalc*) takes 19.5 seconds, almost five times as long.

Software

Of course, without software, even the fastest machine is useless. For testing, Monroe provided me with *SuperCalc*² (under MS-DOS), *Condor 3*, and *WordStar* (both under CP/M-86). The company also sent me a fat listing of programs available for its computers, but only 22 were for the 2000. Four of these are from third-

party sources, the rest are from Monroe (including the three that were provided with the review unit). A number of these programs are vertical-market-type applications (such as a program to manage a wine cellar), so there's not much to choose from at this point. A Monroe spokesman said that an update to the directory is being prepared, and it will list about 40 additional packages for the 2000. This list should be ready by the time you read this, so you might want to contact Monroe to check on what programs have been added.

In sum, the Monroe 2000 is an expensive computer with limited software availability (at least for now). Aside from its calculating speed, there is little to love about it, but it does not appear to have any fatal flaws, either.

The Tandy TRS-80 Model 2000

If the Monroe 2000 is a steady presentation of a consistent standard, the Tandy TRS-80 Model 2000 represents a paradoxical combination of conflicting design



MONROE AND TANDY

strategies. This shows up both in the performance and in the physical features of the computer's design.

An illustrative example is that the processing speed of the Tandy's 80186 processor is offset by the way the high-resolution display works. The unit I tested was equipped with the high-resolution graphics option (\$449 extra) as well as the extra memory to permit high-resolution graphics in color (\$199 extra). The CM-1 Color Monitor displays the 640 × 400 graphics beautifully, creating clear and striking color images.

On the other hand, the display slows down the machine's performance. When I first ran the prime number program, I could not believe the results: 2 minutes and 13 seconds. That was fully twice as long as the IBM PC's time! Where was the 80186 processor's vaunted speed?

I then removed (by changing to REMark statements) all the lines that updated the display during the looping part of the program. This time the Tandy came through in an appropriately slick 7 seconds (compared with 6 seconds for the Monroe and 17 seconds for the IBM PC). This indicates that the beautiful display extracts a tremendous penalty in operating speed, more than negating the gains of the advanced processor design.

I also timed how long it took to list the 38-line prime-number program on the screen (after I had already filled the screen with a previous listing of the same program). It took 16 seconds (fewer than 3 lines per second), while the Monroe performed the feat in just 2 seconds.

The Tandy Model 2000's split personality also shows up in the clash between its desire to present the image of a solid, high-powered, executive workstation, and Tandy's reputation for affordable personal computers for the home. Evidence of an effort to create an upscale product shows up all over the place. Perhaps most prominent is the absence of the words *Radio Shack* on its nameplate. Instead, this is the "Tandy TRS-80 Model 2000," a clear attempt to disassociate this computer from

the hobbyist-oriented Radio Shack Model I and Color Computer. With this in mind, executive-type options such as a mouse, a monitor pedestal, and even a floor stand are available for the computer, so that you can configure your machine to get the most productivity out of the minimum amount of desk space.

Even the manuals are much improved over earlier Tandy offerings. Gone are the familiar, brown padded-vinyl, 11-inch

The processing speed of the Tandy's 80186 processor is offset by the way the high-resolution display works.

binders. They have been replaced with colorful, attractive 9-inch manuals in slipcases. The instructions are clear, and the clean, typeset page design is easy to read. (Some of the manuals for the application programs appeared to have been reduced from an 8½ × 11 format, but the print was still large enough to read easily.)

On the other hand, the computer is still made of Radio Shack white plastic. A peek inside the case reveals a metal foil lining to reduce RF interference. The designers tried to make the package more attractive than earlier TRS-80 efforts, but the Model 2000 is a near-miss at best, with its oversized, red, illuminated power switch dominating the front.


The Tandy's "ergonomic design" results in a tiny keyboard (a full 2 inches shorter than the PC's) with 90 keys crammed together. The arrangement of keys is unique, with 12 function keys in groups of four on the top row and four cursor control keys between the Enter key and the numeric keypad. The "strange" punctuation symbols (the tilde, for example) appear on the number keys of the

numeric keypad. There are slots at the top edge for function key labels, but instead of making them one long strip, the designers chose to break them up into three little 2-inch by ½-inch sections, which are hard to handle and probably easy to lose. The nicest things about the keyboard are its lighted Caps and NumLock toggle switches, and its cable, which attaches to the front of the computer.

Tandy seems confused about whether or not you should be allowed to touch any part of the computer besides the power switch and the keyboard. In a significant departure from its past policy, you may now install some items yourself without voiding the warranty. You may put in memory boards by yourself (and bring the total memory from the standard 128K to a maximum of 768K). You can even add extra memory to cards, which come with 128K with room for an additional 128K. The catalog says that this additional card memory is "user installable" but adds that "installation by our technicians is recommended." When it comes to expanding the motherboard memory, though, the familiar reminder "Installation required, not included" returns.

The reason for the difference is that you can install cards without taking off the cover. The cards use an odd connector (I've never seen one like it) with three rows of 32 pins. There are four slots (plugs?) available, and a machine with 768K memory and the graphics card would still have a slot left over. The motherboard, on the other hand, is slung under the case like a spare tire under a pickup truck. A connector in the middle of the board hooks up with the disk drives and expansion cards "upstairs" in the case and, from my timid peeking, I would gladly leave its removal and replacement to a trained technician. All things being equal, of course, I would prefer to be able to get at it myself; I hate to pay someone else for the simple task of plugging in a batch of memory chips.

One remaining area of conflict is the issue of IBM PC-compatibility. Tandy



CompuServe

If you could get your investment information where Wall Street gets its investment information, you'd get it from us.

Now CompuServe's Executive Information Service puts the most accurate, comprehensive investment information available at your fingertips.

For the first time ever, individual investors can join the ranks of the most prestigious Wall Street firms who depend on CompuServe to provide them with a broad spectrum of comprehensive financial information for research, portfolio management and merger/acquisition strategies. **Instant retrieval** of continuously updated quotes on over 9,000 issues and 10 years of daily historical pricing on over 50,000 securities... **Standard and Poor's** descriptive information on more than 3,000 companies... **Value Line Data Base-II** extensive fundamental data to analyze the performance of more than 1,700 major corporations...

Disclosure II descriptive and financial information derived from SEC filings for over 8,500 companies...

Institutional Brokers' Estimate System (IBES) earnings projections on over 2,800 widely followed companies...

Evans Economics daily updated economic forecasts, historical statistics and analysis of more than 20 major economic indicators plus continuous public opinion polls on economic and financial issues...

Reports on technical market trends, personal portfolio evaluation and the most comprehensive analysis capabilities currently available.

You get all this plus demographic information on every zip code in the U.S., access to consultants through the Geneva Series, state of the art electronic communications, the full scope of the prestigious AP Wire Services, travel information and reservations and more of the high quality financial information that has made CompuServe

the premier supplier of investment information to the greatest names on Wall Street.



For a free
illustrated guide
to CompuServe's
Executive Information
Service, write or call:

Name
Address
City
State Zip

CompuServe

Executive Information Service
P.O. Box 20212
5000 Arlington Centre Blvd.
Columbus, Ohio 43220

800-848-8199
In Ohio, call 614-457-0902

An H&R Block Company

MONROE AND TANDY

does not claim that the Model 2000 will run IBM software, and one glance at the expansion card connector shows that it is not hardware-compatible either. Also, the Tandy uses a different disk format than the IBM PC, providing a nominal 720K (714K after formatting) per disk—more than twice as much as the IBM PC's disks hold. The Tandy Model 2000 uses 96 tracks per inch on double-sided, double-density drives.

Tandy has not completely ignored IBM compatibility, however. While the Monroe refused to even look at an IBM formatted disk, the Tandy Model 2000 can read and even run programs from a DOS 2.0 disk. I was able to load and run the prime-number program directly from an IBM disk (after booting the computer with the Tandy MS-DOS operating system). The only hitch was that the computer froze after each run and had to be reset. Still, this means that you should be able to at least transfer data from an IBM PC to the Model 2000 (provided that the data is stored in ASCII text files). While this is inconsistent with Tandy's disregard for IBM compatibility, it's still a plus.

**Tandy has arranged
for many IBM
programs to
become available in
the Model 2000
format.**

Tandy has also arranged for many popular IBM programs to be made available in the Model 2000 format. The machine provided for this review came with *dBASE II*, *PFS:FILE*, *Multiplan*, and *Videotex Plus* (a communications package), all bearing the Tandy logo. Tandy also has the *MultiMate* word processing package, the *MAI/Basic Four* accounting programs, and some *Infocoin* adventure games.

To make even more programs avail-

able, Tandy has made arrangements with third-party publishers so that you can order other packages through your local Radio Shack store, even though the publisher supplies the support. *WordPerfect* and *WordStar* are two programs that are already available through this "Express Order Software Service." The service is new and relatively few programs have been included so far, so you'll have to check with a Radio Shack store to find out if they have what you need.

Performance

As mentioned above, the 80186 processor works quickly when it is not being held back by the color display. The spreadsheet test gave further evidence of this, as the Model 2000 recalculated the 1,000 cells in 5.1 seconds (less than a second slower than the Monroe).

Since *WordStar* was not included with the machine (nor was any other word processing program), I tried loading the IBM version to test the disk speed. Unfortunately, the Tandy Model 2000's PC-compatibility did not extend that far, so I was not able to get a time for this operation. The disk format utility was fast, however, clocking in at 1 minute and 25 seconds. This is just about twice as long as the IBM PC format utility—reasonable given the fact that the Model 2000's disks have twice the capacity. One nice touch on the format routine is that the screen displays the program's progress as a series of dashes in a line. This tells you that something is happening and allows you to estimate how long you'll have to wait until the job is complete.

The Tandy Model 2000 also goes through a self test when you turn it on. To check it out, I tried the same trick I tested on the Monroe; I pulled out the keyboard cable before powering up. The Tandy blithely went ahead, loaded DOS, and waited for my response to the date prompt. Clearly, this machine's power-up diagnostics are less comprehensive than the Monroe's.

The disk drives have an unusual door

design that works like more standard arrangements: first you insert the disk until it clicks in place, and then you push a latch down. There is no mechanism to keep you from closing the door on an empty drive,

**Both machines are
fast, have quality
graphics, and
high-capacity
disk drives.**

however. Also disconcerting was the fact that the disk activity lights glowed constantly; when a disk drive was accessed, its light merely glowed brighter and then dropped back to a lower intensity when it was finished. Perhaps there was a small voltage leak in my review machine, or perhaps it is supposed to work that way. In either case, I would feel more comfortable if the lights were either on or off, not in between.

The Tandy TRS-80 Model 2000 is a reasonably priced machine with the advantage of wide availability. There are now 1,100 Radio Shack Computer Centers, and computer items are also sold at some regular Radio Shack stores. While the Tandy shows some of its low-price heritage in its cramped keyboard and plastic case, it does pack a computing punch with its 80186 design, and it can handle a large memory as well.

Different or Better?

It is fine to explore the strange new worlds defined by these two adventurous machines, but in the end, we must come back to the key question of whether they are better enough to warrant being so different.

Both machines are blessed with fast computing speed from their 80186 processors, high-quality graphics, and high-capacity disk drives. On the other hand, both have limited software availability. Neither machine will accept IBM access-

MONROE AND TANDY

ries, so you will have to rely solely on the manufacturer to provide enhancements such as local area networks, hard disks, tape backups, and the like.

The Monroe stands apart in that it costs more, in part because of its many built-in hardware features. Its three operating systems also give you broad options for software formats. If you need the computing speed and Monroe has the software you

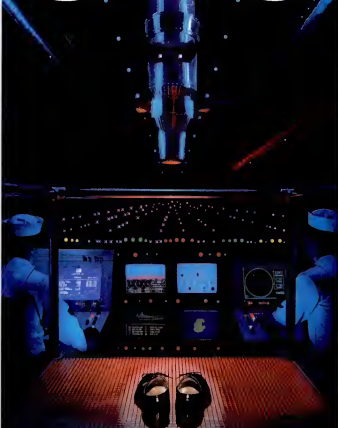
If you need the computing speed and Monroe has the software you need, it is a machine worth considering.

need (or you plan to develop your own), it is a machine worth considering.

The Tandy costs about \$700 less than a comparable Monroe at nearly the same computing speed. Tandy is making an effort to make popular titles available. Its ability to read IBM data disks is a real plus. On the other hand, I found the keyboard cramped and difficult to use; this might be acceptable in a portable, but not in a desktop machine. Given the limited choices available for hardware expansion (only what Tandy will offer), and the fact that there are few discount options available for purchasing Tandy equipment, this machine should be considered only by users certain that they would be satisfied with what they can find in the local Radio Shack Computer Center.

On balance, these two machines present some nice design details and a few quirks. The decision to choose one of them over the PC or its "clones" rests on whether you are willing to trade the availability of "mainstream" software and hardware options for computing speed and disk capacity. For those with specific needs or adventurous spirits, these computers could live long and prosper. ■

GATO



Now YOU step in!

Please send me
 Copies of GATO @ _____
 Poster of GATO @ _____
 Tax (CO residents) _____
 POSTAGE: Add \$1.00 per item
 Visa or M/C# _____
 EXP. _____



\$39.95 = _____
 5.95 = _____
 4.1% = _____
 Total Pst = _____
 TOTAL \$ _____

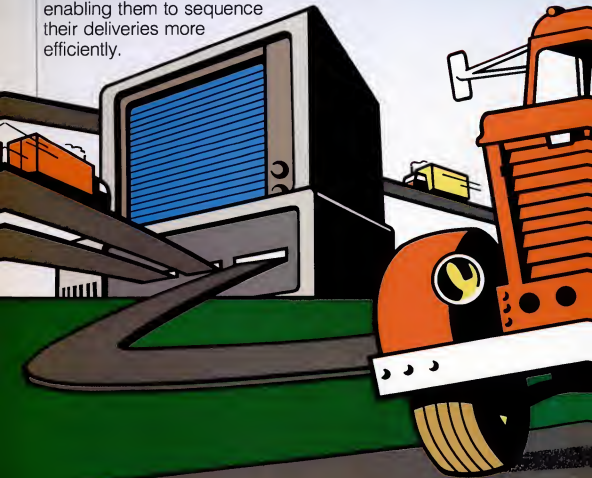
Make Checks Payable To: Spectrum Hobby Inc.
 2006 Broadway, Suite 201
 Boulder, CO 80302 (303) 443-0991

(OR CHECK AT YOUR LOCAL COMPUTER STORE)

Requires 128K RAM one double-sided disk drive. Color graphics adapter IBM personal computer series. (Including PC Junior)

The PC Masters the Route Between Truck Stops

Routemaster and Truckstops help truck dispatchers increase profitability in business by enabling them to sequence their deliveries more efficiently.





TRUCKING

The closer you get, the larger it seems. It's four long steps up to the level of the cab. Inside, the view is excellent to the front, nonexistent to the back. The red plush and black vinyl cab interior is wider than the widest car; your seatmate on the right is more than an arm's length away. The air seat takes your weight with a little give as you settle into it. Put the key into the ignition and turn it. Press the starter and the diesel comes to life. Seven forward gears and two reverse. The clutch and brake are in their accustomed places. You feel like you're going to drive a house, but you're actually in a truck.

Trucks are as integral to our lives in the eighties as trains were in the thirties. Aside from financial investments and real estate, it's likely that you own nothing that wasn't loaded on a truck at some point.

The trucking industry comprises many small operations. In the United States, there are about 17,000 trucking firms and an uncounted number of private truck fleets. The industry employs over 9 million people, more than any other major industry group.

As in other competitive industries, profitability in a trucking business often depends on efficiency. Since the trucks

and the drivers themselves are usually the company's largest single expense, using them efficiently can be critical. Now, two new programs for the PC, *RouteMASTER* and *Truckstops*, can help truck dispatchers operate their businesses more effectively.

Before you can understand how each program works, you need to understand the dispatcher's job. A truck dispatcher's task begins each day when the company's customers phone in their orders. Materials are picked from stock, and the dispatcher decides which orders to load on which trucks. This apparently simple job requires balancing a number of elements:

- Some trucks are on the road, and some are available. Each is different from the others. A wise dispatcher makes the best possible use of the equipment on hand and plans its availability for several days or weeks ahead.
- Customer orders come in at random. The loads and their destinations are different each day and impossible to predict. Some days five or six orders will fit on one of the smaller trucks; another day two orders might overflow the largest trailer.
- Customers often have special requirements. For instance, many will accept deliveries only at particular times of the day. Some have truck docks and forklifts to speed unloading, while others require unloading by hand from the street.

The dispatcher must plan the shortest possible routes to keep the cost of operating the truck fleet as low as possible. With all the variables to consider, there are millions of alternatives.

RouteMASTER

In the past, most dispatchers have relied on a map and an intimate knowledge of the routes, customers, trucks, and drivers to sort out their options. But as the cost of computing has steadily declined, managers in many trucking companies have begun to realize that programs like *RouteMASTER* and *Truckstops* can help even the most experienced dispatcher.

RouteMASTER is offered by Applied Operations Research, Inc. Its purpose is to

optimize the sequence of stops in a single truck route so the truck covers its route in the shortest time or with the lowest mileage at the least cost. *RouteMASTER* makes short work of the thorny mathematical problem and presents you with a detailed stop sequence for the route.

The program begins with a user-defined table of the distances between each stop and all other stops. This "distance" can be stated in miles, dollars, or hours. If you like, you can even measure distance in units of beauty and calculate the most scenic way to cover your route. The system provides editing and maintenance routines for the table. Or if you prefer, you can generate the data by using other software and put it on a diskette in *RouteMASTER's* format.

To begin you are presented with four options: a tutorial, data entry and maintenance, the main routing optimization program, and the system exit to DOS. Pressing a single key moves you to the appropriate program.

If you create your own file of stops outside of *RouteMASTER's* file-maintenance procedures, you can enter that filename, and *RouteMASTER* will sequence the stops. Unfortunately, it won't let you list the files on a diskette from within the program. If you forget the filename, you have to stop the program, use the DIR command to list the files, and restart *RouteMASTER* to run the optimization.

Similarly, it uses stop names in place of stop numbers; you have to remember exactly how all names should be spelled. If you spell a name incorrectly and can't remember the correct spelling, you have to return to the main menu, invoke the editor, and list the stops on the route. You then return to the main menu, re-invoke the optimizer, and start over. Still, some people will prefer names to numbers, even when spelling problems occur. It's a good idea to keep a complete list of your stop names handy.

What's more, you have to know how many stops are represented on the file because *RouteMASTER* asks you for the



RouteMASTER

Applied Operations Research, Inc.

22056 Satcoy St.

Canoga Park, CA 91303

(213) 340-1419

List Price: \$195

Requires: 128K RAM, one disk drive.

CIRCLE 761 ON READER SERVICE CARD

Truckstops

MicroAnalytics, Inc.

8409 Hunt Valley Dr.

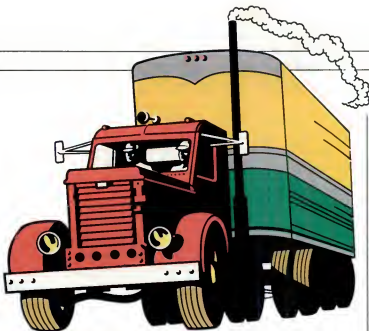
Vienna, VA 22180

(703) 281-8730

List Price: \$895; demo disk, \$45

Requires: 128K RAM, one disk drive.

CIRCLE 760 ON READER SERVICE CARD



Under certain circumstances, Routemaster can help increase profitability in a trucking operation. But when it comes to more complex operations, MicroAnalytics' Truckstops might do a better job.

number of stops on the route. If you forget, stop and restart again. Familiarity with the system will reduce these problems. Nonetheless they are certainly a nuisance and potentially a colossal waste of time.

When you ask *Routemaster* to sequence the stops on the route, you can specify both the starting and ending points for the route, which can be open or closed, depending on need. Sometimes drivers take their trucks home at night, so the first stop on the route is always the pickup point and the last stop is always home. Other drivers both start and end their routes at one location, driving a complete loop each day.

Routemaster works. It gave me good answers every time and did so reasonably quickly. In one test it calculated a 20-stop route in about 8 minutes. Running times will increase with the number of stops on

the route, so be prepared to wait a bit if you want to optimize 50 stops.

No Human Allowances

But *Routemaster* tackles only part of the real problem. First, it assumes you have assigned each stop to a route, and it optimizes only stop sequences. Second, it ignores payload limitations, which may require that one stop be visited before another so material can be unloaded before making a pickup. And it fails to recognize time of day as a factor. Most businesses accept receipts and make shipments only during specified hours. Human dispatchers routinely make allowances for their customers' schedules, but *Routemaster* assumes all stops can be made at any time of day. These considerations don't rule it out as a worthwhile truck routing tool, but for some cases they do limit its value.

I wish *Routemaster* were a little more

intelligent. If the distance between points A and B were specified in miles and if the distance table included an average speed and an average loading time at each stop, then the program could at least report the arriving and departing times by stop. This relatively simple addition to the program would make it significantly more useful.

Routemaster will be most valuable in cases where routes are not load-sensitive or cube-sensitive (salesmen's routes, and overnight-delivery pickups, for example), where routes are not time-sensitive (no deliveries after 3 p.m.), and in cases where stops are semi-permanently assigned to routes and changed only infrequently.

One final gripe: *Routemaster* won't record solutions on disk, so it is unable to reprint reports. It will present its results on the screen or on both the screen and the printer, but if the printer hangs up and you didn't write down what you saw on the screen, you have no choice but to rerun the entire optimization routine.

Routemaster is written in both compiled BASIC and assembler. It is not copy protected and will run on a hard disk. Its manufacturer, Applied Operations Research, provides unlimited free telephone support with every purchase and will quote modifications to the program based on your specifications.

Truckstops

Under certain circumstances, *Routemaster* can help increase profitability in a trucking operation. But when it comes to more complex operations, *Truckstops*, from MicroAnalytics might do a better job. It's more expensive, more complicated, and harder to use, but it can handle significantly more complex problems.

Truckstops works from three data files, which you can program yourself or create with the system's file editor. One of the three files covers basic system control variables, a second deals with the trucks, and the third, the route stops. *Truckstops* does two things: It designs a route for each truck and then sequences the stops on that

route to minimize the total route cost in terms of mileage, time, and overtime—all subject to constraints.

Truck loading (and therefore route design) is limited by both the number of hours in a day and by the capacity of the trucks. You control these limitations through a series of specific entries and defaults. To begin you create the general parameter file, which establishes a number of policy variables and defaults. You can specify, for instance, the length of the driver's lunch hour and the time of day when it should be taken, the typical work-day length, the permissible amount of overtime, the *x-y* coordinates of both the origin and destination of the routes, and the default truck unloading rate.

Next you must enter each truck into *Truckstops'* truck data file. Each must be defined in terms of capacity, earliest route starting time, latest route completion time, and cost factors for mileage, hours, and overtime hours.

Finally, stops must be recorded. For each stop you must enter the stop name, an *x-y* coordinate, an unloading rate if different from the default, the number of pounds (or cubic feet) to be delivered, and other information.

Part of *Truckstops'* database is a multi-tiered speed zone arrangement used to calculate driving times between stops. The driving time, the load quantity, and the unloading rate for each stop are combined to calculate projected arrival and departure times. These times, of course, must coincide with the hours when the customers will accept shipments. Once the database is complete, you can run *Truckstops'* route design logic, which gives you a choice of two algorithms; one provides a quick-and-dirty solution, but handles large problems and takes relatively little time to finish its work; the other is more precise, but takes longer to run and won't handle large problems. At times these two routines can come up with different answers to the same problem. But, in my tests, the differences were minor.

Both algorithms work in the same gen-

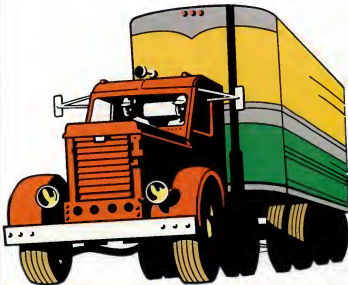
eral way; they consider stops in sequence according to a priority scheme. Each stop is assigned to a route based on such factors as distances to other stops on the route and the available capacity of the truck. The newly added stop is then sequenced with the others to minimize mileage, while still observing timing restrictions at the customer's dock. This method is susceptible to suboptimal solutions because, once assigned to a route, stops are never reassigned. MicroAnalytics recognizes this, but claims that, in practice, the software produces results that are "good enough." That is, they are consistently better than a

person could achieve with pencil and paper in a reasonable amount of time.

Loading the Final Truck

When *Truckstops* has fully loaded all the available trucks, it quits. Any stops that have not been planned at this point are simply excluded from the day's routes. The program would be improved if it allowed you some measure of control over the sequence in which stops are assigned. That way you could give priority to certain customers.

Truckstops' primary report is a route report, which can be printed or displayed



Truck loading is limited by both the number of hours in a day and by the capacity of the trucks. You control these limitations through a series of specific entries and defaults.

on the screen on a route-by-route basis. It shows customer names and locations, quantities to be delivered, planned delivery times, and distances between stops. Although it does not qualify as either a manifest or as a bill of lading (because it makes no provision for listing the number of containers on the load or their contents), it does provide adequate routing information and serves as route instructions for the driver. Summary versions of this report are available for management.

Nits and Nats

Truckstops was written before the IBM PC was introduced to the market. Although major portions have been rewritten specifically for the PC, at least one awkward legacy remains: hard-coded disk drive defaults. If you have a single-drive system and add a second drive, you'll probably want to change the default to drive B: for the data files. Unfortunately, the change can be made only by MicroAnalytics. The company will do it free of charge, but it is a nuisance.

I found *Truckstops* to be nearly flawless in operation, though not without a few minor annoyances. First, menus are inconsistent. For instance, in the editing routine for the general parameter file, the file is displayed. If you want to change a value, you must place the cursor over that value, type M for modify, enter the new value, and press Return. But, when you are editing the stop file, *Truckstops* wants you to press R for re-enter and then move one at a time through the values. For each value, the editor allows you to press Return to retain the existing value or to re-enter the value. While this inconsistency may seem unimportant, it is an impediment to learning the system.

I also noted a few minor errors in the screen displays. *Truckstops* includes a routine that is intended for simple and fast re-entry of the customer's delivery quantities. For instance, I entered a quantity of 1000 and later changed it to 100. The program accepted the change but forgot to print blank characters after the new value.

This left the last zero from the old 1,000 on the screen and made the new 100 look like the old 1,000. In another instance, a screen failed to clear correctly.

MicroAnalytics says that an entirely new editor is in the works and will be standard on the system by late summer. You should ask about it if you're interested in buying *Truckstops*.

Another irritation: *Truckstops* consists of eight programs, each of which displays the copyright notice and waits for a key-stroke before proceeding. This happens every time a program is started, even if the program has been called from another program. More important than the extra key-stroke is that the user's concentration is broken. Indeed, this is trivial in light of the overall value of the system, but it is just plain silly to display the copyright notice more than once.

Truckstops arrives on three disks. One is a 128K version of the system, the second is an "expanded RAM" version, and the third contains the source code, excluding MicroAnalytics' proprietary computation algorithms. Since BASIC source code is provided, you can modify the system—or contract with a programming house to modify it—so inputs can come from an existing order entry system and outputs can be passed to a distribution/warehousing system. Or, you could modify the existing reports or add new ones. Inclusion of the source code makes *Truckstops* a more powerful and effective tool than it would otherwise be. The code itself appears well done. Routines are clearly labeled, and statements are properly indented for legibility. All in all, the programs are readable and understandable. Anyone with some BASIC experience and with a copy of IBM's BASIC manual should have no trouble with them. My only criticism is the extensive use of single-letter variable names. For instance, the variable Q\$ is harder to understand than one called STOPNAMES.

MicroAnalytics offers a wide menu of custom modifications. A few, such as resetting the default disk drives and redi-

mensioning arrays, are offered at no charge. For others, including reformatting screen displays, enhancing *Truckstops* to handle backhauls, and other special requirements, MicroAnalytics will provide quotations on request.

Anyone with some BASIC experience and with a copy of IBM's BASIC manual should have no trouble reading *Truckstops*' code.

You can purchase 8087 support for *Truckstops* at an extra cost of \$245, assuming you have already installed the 8087 math chip in your PC. According to MicroAnalytics, this support will reduce processing time by 40 to 60 percent. I advise trying the system without the 8087 first. My test problems were small, and the system was respectably fast.

Other options are standard and pre-priced. I did not test any of these, but they sound useful. These include multiple load constraints, which permit simultaneous loading to both weight and cubic space limits (\$150), multiple time constraints, which can limit both driving and total working time (\$150), and the handling of physical "barriers" such as a lake or mountain (\$250).

Still other features can be added on a custom basis: input from a distance file, rather than from x-y coordinates stored in the customer/stop file, load-splitting, multiple-day routes, and city and town location databases. MicroAnalytics will quote these features on request.

Truckstops is not copy protected and will run from a hard disk. The manufacturer provides unlimited free telephone assistance with the system purchase. A tutorial and demonstration diskette is available separately. ■



THE NAME TO LOOK FOR WHEN YOU BUY A PERSONAL PRINTER ISN'T IBM®.

It's Okidata. Before you buy an IBM printer for your IBM PC, look underneath the initials. It's actually a printer built by another company that just wears the IBM name.

We tell you this because having the right printer is very important. Before you buy you should know what you're getting, and when you buy an Okidata you're getting the best printer there is.

We live, sleep and breath printers. We specialize in building printers... seven different printer models to be exact. So you can fit the printer to the application, not the application to the printer.

We make versatile printers with three print modes: data processing for speed, enhanced for emphasized printing and correspondence for letter quality. (You know who only gives you one or two.)

We make fast printers. For example, while an IBM 5152 is plodding along at 80 characters per second, an Okidata

ML 92 is printing the same data twice as fast. Some Okidata models reach speeds up to 350 characters per second... an incredible rate that produces five pages in just one minute.

We make printers that match a daisywheel for crisp, clean letter quality, but print much faster than a daisywheel ever could. And Okidata gives you full graphics capabilities for printing all kinds of charts and graphs. You can even print custom typefaces and symbols.

Your IBM's better half. If you're wondering how compatible your Okidata will be with your IBM PC, the answer is "completely," including all popular software packages. And most important, you can buy Okidata printers configured for IBM at no extra cost.

And if you're wondering about service, it's available nationwide through Xerox Service Centers. Of course, chances are you won't need it. Okidata has the best reliability record in the in-

dustry, with a warranty claim rate of less than 1/2 of 1%.

Select, don't settle. Pick your printer for its performance, not its initials. Pick Okidata. Because a printer by any other name just isn't the best printer.

Call 1-800-OKIDATA (609-235-2600 in NJ) for the name of the Authorized Okidata Dealer nearest you. Okidata, Mt. Laurel, NJ 08054.



OKIDATA
an OKI AMERICA company

IBM and the IBM logo are registered trademarks of International Business Machines, Inc.

CIRCLE 285 ON READER SERVICE CARD

Adapting Your Display for Speedy Updates

The FULSCRN program allows your BASIC programs to update the screen in a twinkling, the way commercial applications do, and without creating "lightning" on your monitor.

Editor's note: Recently, manufacturers have announced several new computers with impressive graphics capabilities. This development has caused much concern among PC owners, who are accustomed to the seemingly sluggish displays that BASIC programs provide.

While the PC was not specifically designed as a graphics machine, and while its several-years-old electronics are not a match for some of the newer models on the market, the PC is capable of far faster displays than most BASIC programmers can imagine.

One of the complaints we hear most often from readers is that BASIC is distractingly slow and that they end up with "lightning" or "confetti" on the screen if they try manipulating images directly in the PC's single-ported color graphics memory.

In the following article, programming wizard David McManigal shows how to coax dizzying speeds out of your PC, from within BASIC and without "lightning," with results that are simply astonishing. You won't believe your screen.

Many commercial software programs can update the PC's display screen in the blink of an eye. They spoil you for standard application interfaces such as BASIC. "Where did the speed go?" you wonder. Obviously,

it's lost somewhere in the programming hinterland between the standard interfaces and the display adapter.

The display adapter is really a computer within a computer. It executes general-purpose programs slowly but can run tai-

You'll find the excitement under the covers.

The most exciting computer news since the micro: Framework.*

It's idea processing, word processing, electronic spreadsheets, database management and automatic graphics. With a unique outlining feature that allows you to put it all together more easily than ever.

Whether you're a novice or a techie, Ashton-Tate has a Framework book to explain the program, its language and application in the detail you require.

Framework: An Introduction, by Bill Harrison

The first in a series of Framework books designed to show users how to take advantage of this new program's flexibility. Includes explanations of all of Framework's major features. A must for first-time users. Suggested retail price \$15.95.

Framework: On-The-Job Applications, by Expert Systems, Inc.

A collection of timesaving applications for those interested in putting Framework to use immediately. An ideal book for business professionals who don't have time to develop their own applications. Suggested retail price \$19.95; with disk, \$29.95. Available Fall '84.



Framework: A Programmer's Reference, by Forefront Corporation

A reference source for programmers developing applications with Framework. Includes a programming tutorial and an extensive functions directory for the FRED™ programming language. Suggested retail price \$24.95.

Framework: An Introduction to Programming, by Forefront Corporation

A first-time-user's introduction to Framework programming. With an extensive tutorial on the functions and capabilities of the software. Suggested retail price \$19.95. Available Fall '84.

Framework: A Developer's Handbook, by Forefront Corporation

A complete handbook for the Framework program developer. Organized for quick and easy access. An invaluable addition

to any developer's library. Suggested retail price \$24.95. Available Fall '84.

So if you're thinking of buying the program, buy the book, too. They're made for each other. And both are made for you.

And Ashton-Tate has a rapidly-growing library of micro-computer-related books for computer users of every level. To get a copy of our latest catalog, contact your local Ashton-Tate dealer. For the name and location of your nearest dealer, contact Ashton-Tate, 10150 West Jefferson Boulevard, Culver City, CA 90230. (213) 204-5570.

ASHTON-TATE ■

© Ashton-Tate 1984. All rights reserved. Framework and FRED are trademarks of Ashton-Tate.

SPEEDY UPDATES

lored programs quite rapidly. Naturally, it would be nice to improve its speed for your own programs. Unfortunately, the complex appearance of a display adapter can make the needed tailoring seem intimidating. Moreover, not everyone is comfortable programming in assembly language, which you need to work effectively with a display adapter. I have drawn a road map for those who would like to try this path to improving their PC's performance without at the same time becoming computer professionals.

Display Adapter Fundamentals

Figure 1 illustrates the general structure of a display adapter. The IBM Monochrome Display Adapter, the IBM Color Graphics Adaptor and compatible display adapters are all built around the Motorola 6845 display controller chip. The 6845 is a

A computer within a computer, the display adapter executes general-purpose programs slowly but can run tailored programs quite rapidly.

highly specialized and powerful microprocessor resembling the Intel 8088, the CPU used in the PC.

The internal registers of the display controller hold parameters that define the display format—number of lines, number of characters per line, synchronization (sync) signal position and width, raster configuration, and so forth. You access these registers by writing the register number to port address 3B4H (for monochrome) or 3D4H (for color), then writing or reading the associated data value at port address 3B5H (for monochrome) or 3D5H (for color).

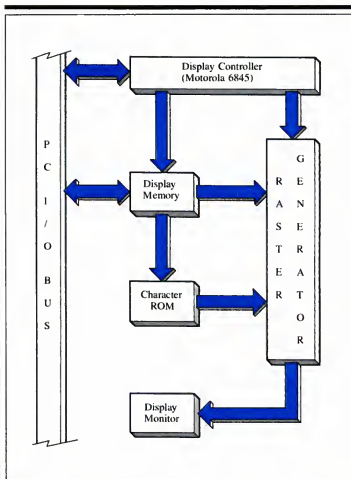


Figure 1: General structure of a display adapter.

Display adapters include other registers that contain the monitor mode (port 3B8H for monochrome, 3D8H for color) and monitor status (port 3BAH for monochrome, 3DAH for color). In addition, the color/graphics adapter has a color selection register at port address 3D9H.

A second key component of any display adapter is memory—4K bytes for the monochrome adapter or 16K bytes for the

color adapter. Higher-resolution adapters incorporate 32K bytes or more of display memory.

Although display memory is separate from other PC memory, the system accesses it exactly as if it were a part of the main memory. The monochrome adapter uses memory addresses B0000-B0FFF hex and the color/graphics adapter uses memory addresses B8000-BBFFF hex.

SPEEDY UPDATES

Since the PC uses different memory and I/O port addresses for the monochrome and color adapters, they can coexist in a single system.

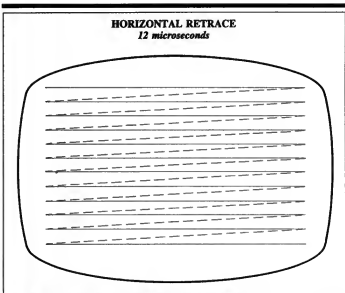
A third major component of a display adapter is the raster generator, which produces the video and synchronous signals needed to drive a display monitor or a TV set. The monochrome adapter produces two video signals (video and highlight) that turn the display beam off, partly on, or fully on at the appropriate time. The color/graphics adapter produces four video signals: red, green, blue, and

Although display memory is separate from other PC memory, the system accesses it exactly as if it were a part of the main memory.

"intensify." The vertical and horizontal synchronous signals that the display controller originates are simply passed on to the IBM Monochrome Monitor or an RGB monitor, but they are combined with the video signals to drive a composite monitor or television set.

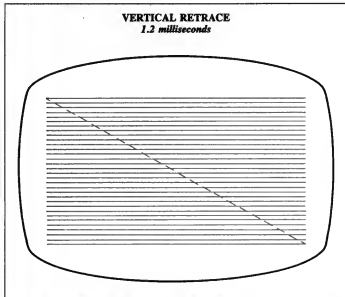
A display adapter's fourth key component is a read-only memory (ROM) that stores a pattern of dots to represent each displayable ASCII character code. The display controller includes counters that keep track of the character column and row, as well as the scan line within each character. The character ROM stores dots for each scan line of a character as a binary word that turns the display beam on and off, thereby producing the character representation. In graphics modes, display memory contents travel directly to the raster generator, bypassing the character ROM. All characters displayed in graphics modes are converted into the appropriate dot patterns by the operating system

HORIZONTAL RETRACE 12 microseconds



Dotted line represents path of beam during horizontal retrace.

VERTICAL RETRACE 1.2 milliseconds



Dotted line represents path of beam during vertical retrace.

before being stored in display memory.

Lightning Strike

For the programmer, one important, basic difference between the IBM Monochrome Display Adaptor and the IBM Color Graphics Adaptor is that the monochrome adapter's memory allows you to write new data to it without interfering with the read operations of the raster generator, while the color/graphics adapter requires dedicated read access to the display memory while each line is scanned. Writing data to the color monitor's display

Because the adapter uses a 60 frames per second refresh rate, omitting an occasional display frame produces no visual effect. A full-screen update takes less than 1/30 second.

memory during a line scan disrupts the raster generation process, producing short horizontal bars on the screen instead of the intended data pattern. The resulting visual effect resembles that of a lightning strike during a thunderstorm. Unlike a real lightning strike, which can damage the computer, these "lightning strikes" cannot harm your equipment; however, they are quite disconcerting, and therefore undesirable.

You can avoid "lightning strikes" by writing data into the display memory only when the memory is not needed for raster generation. Three programming methods can do this job.

1. You can wait for the horizontal retrace period, when the CRT beam is

TITLE		FULSCRN Full Screen Output Subroutine	
PAGE			
COOESEG	SEGMENT	PARA	PUBLIC 'CODE'
ASSUME CS:COOESEG,OS:NOTHING,ES:NOTHING			
FULSCRN	PROC	FAR	
	PUSH	BP	; SAVE BP REG
	MOV	BP,SP	; COPY STACK POINTER
	PUSH	ES	; SAVE E-SEG REGISTER
	MOV	BX,0B000H	; MONO CARO BUFFER SEGMENT
	SUB	CX,CX	; INIT COUNT REG
	CLO		; OIRECTION = FORWARD
	MOV	ES,CX	; POINT TO SEGMENT 0
	MOV	DI,ES:[44EH]	; INIT SCREEN BUFFER POINTER
	MOV	AH,25	; INIT LINE COUNT
	MOV	DL,ES:[449H]	; GET OISPLAY MOOE BYTE
	SUB	OL,7	; MONOCHROME?
	JZ	...YES	
	MOV	BH,0B8H	; COLOR CARO BUFFER SEGMENT
	AOR	OL,3	; GRAPHICS MODE?
	JS	ALPHA	; ...NO
	MOV	AH,200	; INIT GRAPHICS LINE COUNT
ALPHA:	MOV	OX,30AH	; AOR OF COLOR CRT STATUS REG
DOWAIT:	IN	AL,OX	; GET CURRENT OISPLAY STATUS
	TEST	AL,8	; VERTICAL RETRACE?
	JZ	DOWAIT	; ...NO (Continues)

Figure 2: Source code for FULSCRN.

turned off while it is deflected rapidly from the end of one scan line to the beginning of the next line. The system signals its horizontal retrace period by setting bit 0 (mask value 01H) of the monitor status register to 1. To make sure the retrace period is not already partially used up, you should first wait for this bit to change to 0, then wait for it to change to 1. You may then write a display memory byte without creating "lightning." A full-screen data update takes at least 1/4 second using this method. Updating both data and display attributes of a full screen takes at least 1/4 second. The standard programming inter-

faces, which also use this technique, require as much as 3 seconds to update the full screen because of other programming overhead.

2. You can wait for the vertical retrace period, when the CRT beam is turned off while it is deflected from the bottom of the screen to the top of the screen between successive display frames. The system signals vertical retrace by setting bit 3 (mask value 08H) of the monitor status register to 1. You should again first wait for the 0 to change to 1. You can then write about 240 bytes without producing "lightning." A full-screen update takes

SPEEDY UPDATES

```

MOV DX,3D8H ; ADDR OF COLOR CRT MODE REG
MOV AL,ES:[465H] ; CURRENT DISPLAY STATUS VALUE
AND AL,DF7H ; DELETE VIDEO ENABLE BIT
OUT DX,AL ; DISABLE VIDEO (BLANK SCREEN)
MONO: MOV ES,BX ; SET DISPLAY BUFFER SEGMENT
MOV BX,[BP]+6 ; ADDRESS OF SCRN$(1)
LOOP: MOV CL,[BX] ; STRING LENGTH
MOV SI,[BX+1] ; STRING OFFSET
SHR CL,1 ; HALVE BYTE COUNT
JZ NULL ; IGNORE LENGTHS < 2
REP MOVSB ; MOVE STRING TO DISPLAY BUFFER
NULL: ADD BX,3 ; STEP STRING INDEX
DEC AH ; COUNT DISPLAY LINES
JNZ LOOP ; ...AND LOOP
OR DL,DL ; MONO?
JZ DONE ; ...YES
MOV DL,0D8H ; ADDRESS OF COLOR CRT MODE REG
OR AL,8 ; SET VIDEO ENABLE BIT
OUT DX,AL ; ENABLE VIDEO (UNBLANK SCREEN)
DONE: POP ES ; RESTORE REGS FOR RETURN
POP BP
RET 2 ; RETURN TO BASIC

FULSCRN ENDP
CODESEG ENDS
END

```

Figure 2: Source Code for FULSCRN continued.

just over 1/5 second using this method.

3. You can wait for the vertical retrace period and then disable the CRT beam for a full frame period by setting the monitor mode register bit 3 (mask value 08H) to zero. You can then update the full screen before re-enabling the CRT beam. Because the color/graphics adapter uses a 60 frames per second refresh rate, omitting an occasional display frame produces no noticeable visual effect. With this method, a full-screen update will take less than 1/5 second.

You might conclude from this description that the third method is the best

because it permits the fastest full-screen update. However, at times you might want to update only a few bytes of the display memory. The first method allows you to do it in a few display line periods, at 63.5 microseconds each, while the third method could take as many as 200 line periods to update a single byte. The third method is definitely the best for updating about 200 bytes or more. The second method is never optimal.

Another reason for preferring the first method in some cases is that the other methods require that all the new display data reside in a single, contiguous area of

main memory before they are transferred to display memory. Method 1, although slower for voluminous output, allows you to write discontinuous bytes or strings efficiently.

These considerations only apply to the IBM Color/Graphics Adaptor. You can update the memory of most other adapters at any time without such special timing.

Display Adapter Programming

In the monochrome and color/graphics adapter character modes, each display position comprises a data byte followed by

You can modify
FULSCRN to
update selected
portions of the
screen. But this
would tend to
degrade the speed
advantage that is
the principle reason
for using FULSCRN.

an attribute byte. To rapidly update the display, using the monochrome adapter is quite simple: just move the new data directly to the display buffer. The color adapter, as I have described, needs synchronization code to avoid "lightning strikes."

Figure 2 is the assembler language source code for FULSCRN, a subroutine that can be called from a BASIC program to display a full screen of data and attributes in one refresh cycle. Figure 3 shows how FULSCRN can be used in a BASIC program. FULSCRN.BAS will construct and display 26 different screens of data at a rate that may surprise you.

Statements 30 to 170 in Figure 3 define FULSCRN. You can include these state-



At last... Lotus 1-2-3™, graphics, 132-column spreadsheet, expandability and much more for your IBM® Monochrome... on a single board: UltraPAK™

Introducing the only board that does it all for your IBM PC. In one slot. At low cost. The UltraPAK: it's everything you ever wanted for your PC.

Never has one single-board package given so much instant and future capability to the IBM PC. From Lotus 1-2-3 compatibility and 132-column display to high resolution color graphics, user-expandable memory and disk controller plus other features and options, the UltraPAK is the board to build your IBM PC on.

Produced to the most demanding and advanced levels of quality, 100% tested and guaranteed for a full year, the UltraPAK represents the ultimate in single-board reliability, innovation and capability. Only from Tseng Laboratories, Inc.



	TLI	Hercules	CCS
Bit mapped graphics	Standard (2 page)	Standard (2 page)	Option (1 page)
132-column x 44-row spreadsheet	Standard	NA	Standard
IBM display compatibility	Standard	Standard	Standard
Parallel port	Standard	Standard	Standard
Serial port	(2) Standard (one std./one opt.)	NA	NA
Clock/calendar battery	Standard	NA	NA
User-expandable (One option per UltraPAK board):			
IBM disk controller w/256K memory	Option	NA	NA
384K memory w/RAM drive	Option	NA	NA
IBM colorgraphics* or high resolution color graphics* (640 x 480 w/16 colors)	Option	NA	NA

*For simultaneous display on a separate color monitor.



Tseng Laboratories, Inc.

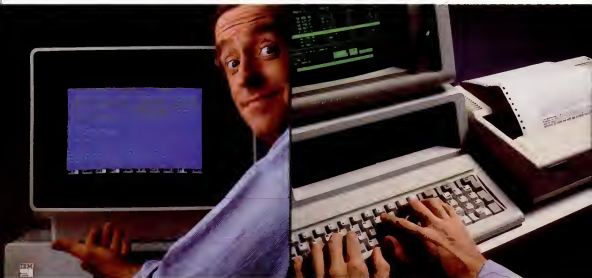
205 Pheasant Run, Newtown Commons, Newtown, PA 18940.
(215) 968-0502. Telex 705179

Enhancement technology for personal computers.

Suggested Retail
Price \$680

See your authorized TLI dealer.

Only one company can show you so many And it isn't IBM.



**Monochrome text. Color graphics.
Even a new super display adapter that provides
the Best of Both, on one board.**

**Connect your PC to peripherals like a
modem or printer, with the added
efficiency of print spooling.**

IBM today sets the standard in personal computers.

But what happens when you want to expand your PC's capability to something beyond standard?

That's when you have to look beyond IBM. To the one company that offers the widest range of products to make your PC work more powerfully, more efficiently.

Persyst.

Display adapters. Persyst introduces a significant technical advance.

Now Persyst redefines the basic utility of display adapters for IBM personal computers.

Our BoB™ super display adapter provides the sharpest text resolution ever as well as brilliant color graph-

ics—the Best of Both—on one board. Plus a unique option that lets you design and download custom programmable character sets.

Meanwhile, for great basic performance, we also offer PC/Monochrome™ and PC/Color Graphics™ display adapters engineered to deliver the same quality as IBM's own standard adapters.

Only Persyst offers you so much choice.

Memory and multifunction boards. Persyst has the most flexible ways to expand your PC.

Here again, Persyst offers a unique array of products to expand your PC beyond the IBM standard.

Want the most capable one-slot multifunction packages available?

Choose either Time Spectrum™ with up to 512K, or Time Spectrum™ SB384 with up to 384K RAM. Other functions include a bidirectional parallel port and async serial ports to link your PC with printers, modems and instrumentation. Calendar clock. Game port. Plus, Wait-Less Printing™ print spooling and Insta-Drive™ RAM disk software.

Want to expand function without adding memory?

Our Timeport™ gives you a calendar clock, bidirectional parallel port and two async serial ports, as well as capability for ROM and static

PC/MONOCROME
DISPLAY ADAPTER

PC/COLOR GRAPHICS
DISPLAY ADAPTER

BoB SUPER
DISPLAY ADAPTER

TIME SPECTRUM
WITH RAMPM™

TIME SPECTRUM SB384



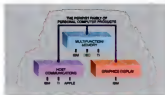
ways to expand the power of your IBM PC.



17664	3-88-83	12:00p
568	2-82-84	7:22p
133	1-81-80	12:08a
4	2-16-84	1:34p
273	2-16-84	3:49a
631	2-16-84	3:56a
288	2-22-84	11:24a
172	2-24-84	5:46p
615	2-24-84	5:58p
563	3-81-84	2:25p
1018	3-82-84	9:06a
311296 bytes free		

Memory expansion to let your PC utilize the most sophisticated software.

Productivity features like a calendar clock to date and time stamp your files automatically.



RAM. Uniport™ offers a calendar clock and bidirectional parallel port. And our Async Card™ provides two async serial ports.

You can even add synchronous communications to your PC with our Multiple Protocol Communications™ (MPC) controller.

Quality and documentation. Persyst support is built into every product.

All Persyst expansion products include one important extra benefit—Persyst quality.

Each board is fully burned in. Completely system tested. And backed by a limited one-year warranty.*

What's more, award-winning Persyst documentation makes using any Persyst product simple.

Expand all the way from an IBM desktop PC to an IBM Intelligent workstation. You can only do it with Persyst.

Persyst is the only resource that offers display adapters. Multi-

function and memory boards. And micro to mainframe communications.

The most complete selection of innovative, technically advanced expansion products to meet your needs today. And tomorrow.

Persyst dealers are ready to serve you. For the one nearest you, call (714) 660-1010.

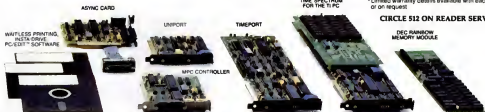
Persyst Products, Personal Systems Technology, 17862 Fitch, Irvine, CA 92714.
Telephone: (714) 660-1010.
Telex: 467864.

PERSYST

"You can only do it with Persyst."

IBM is a registered trademark of International Business Machines Corporation. Rainbow and DEC are registered trademarks of Digital Equipment Corporation. T1 is a registered trademark of Texas Instruments Corporation. *Limited warranty details available with each product or on request.

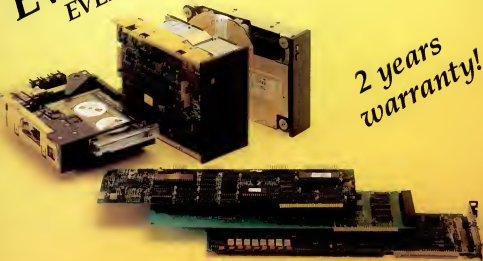
CIRCLE 512 ON READER SERVICE CARD



EVEREX

EVER for EXcellence

2 years
warranty!



Everex Storage Subsystems Plug Right Into Your Business!

Everex combines **Reliability, Support, Ease of Use and Best Price Performance Ratio** into a full product line of internal storage subsystems and plug-in controller cards. Now you have no excuse not to turn your IBM® PC into an XT! Actually, more than an XT, when you combine our **Half-Height** hard disk with our **Half-Height** streaming tape.

Hard to believe? Well, believe this, both the hard disk and streaming tape **Plug Right Into Your System.** Incredible? Unique? That's EVEREX for you.

Plug-in Subsystems

■ **Hard Disk Drive with Everex Controller Card** — we're offering you anywhere from 10–40MB of storage, in half or full height, that you can directly plug into your PC with **No Software Patch Required.** And we are so confident of our Hard Disk Drive that we are backing it with a **FULL TWO-YEAR WARRANTY*** All this starting at a **LOW** suggested retail of \$1,195!

■ **Streaming Tape with Everex Controller Card** — you get 20–45MB of high-performance back-up storage in minutes. And **REMEMBER**, this is a half-height streamer! The price is something to remember too — starting at **ONLY \$1,135** suggested retail.

Combined with the half-height hard disk, you've got something you can really talk about — an XT that backs itself. Only from Everex.

Controller cards sold separately:

■ **ULTRA DISK™** — Controls both the hard disk and floppy disk drives at the **same time**, saving you both space and money. Suggested retail — \$525.

■ **Floppy Disk Controller** — easy to install at \$220 suggested retail.

■ **Streaming Tape Controller** — direct plug-in and very reliable. Suggested retail — \$315.

Want to know more? Just ask your local dealer for all the details.

*Two-year warranty on Hard Disk Drive, one-year warranty on the controller card.

OEM Inquiries Welcomed.

Price subject to change without notice



Everex Systems, Inc.
CIRCLE 114 ON READER SERVICE CARD

OEM and Dealer Hotline 800-821-0806. In California call 800-821-0807.

891 Maude Ave., Mountain View, California 94043 (415) 967-1495
IBM is a registered trademark of International Business Machines Corp.
Ultra Disk is a trademark of Everex Systems, Inc.

AD-102

SPEEDY UPDATES

ments (with appropriate line numbers, of course) in any BASIC program in which you wish to use FULSCRN. Each string in SCRN\$ (or whatever you choose to call the screen image array) represents one display line, including display attributes. Conventional BASIC programming techniques will permit you to update array SCRN\$ quite easily. Then, you can redisplay the entire screen with a single call to FULSCRN.

You should bear in mind that FULSCRN will override any prior PRINT statements each time it is called. Of course, you could modify FULSCRN to

By reading PC manuals and other literature and then experimenting with PC functions, any reader should be able to come up with new techniques for using the PC more effectively.

update selected portions of the screen, leaving undisturbed other portions for use with PRINT statements. But this change would tend to degrade the speed advantage that is the principal reason for using FULSCRN in the first place.

FULSCRN is most useful for the color adapter because it speeds screen updates without creating "lightning strikes." However, it is also useful for the monochrome adapter, because an assembler language string move operation is much faster than a BASIC POKE loop, even in compiled BASIC. Because FULSCRN determines which monitor is currently active, and in which mode, it permits considerable application flexibility. It can

```
10 REM      First, define FULSCRN
20 REM
30 DIM CODE$(47): A1=0: I1=0: J1=0
40 DEF SEG: A1=VARPTR(CODE$(1))
50 FOR I1=1 TO 93: READ J1: POKE A1,J1: A1=A1+1: NEXT I1
60 DATA &H55,&H8B,&HEC,&H06,&HBB,&H00,&HB0,&H2B
70 DATA &HC9,&HFC,&H8E,&HC1,&H26,&H8B,&H3E,&H4E
80 DATA &H04,&HB4,&H19,&H26,&H8A,&H16,&H49,&H04
90 DATA &HB0,&HEA,&H07,&H74,&H1B,&HB7,&HB8,&H80
100 DATA &HC2,&H03,&H78,&H02,&HB4,&HC8,&HBA,&HDA
110 DATA &H03,&HEC,&HAB,&H08,&H74,&HFB,&HBA,&HDB
120 DATA &H03,&H26,&HAA,&H65,&H04,&H24,&H77,&HEE
130 DATA &H8E,&HC3,&H8B,&H5E,&H06,&HBA,&H0F,&H8B
140 DATA &H77,&H01,&H0D,&H09,&H74,&H02,&H73,&H45
150 DATA &H83,&HC3,&H03,&HFE,&HCC,&H75,&HEE,&H0A
160 DATA &HD2,&H74,&H05,&HB2,&H08,&H0C,&H08,&HEE
170 DATA &H07,&H5D,&HCA,&H02,&H00
180 REM
190 REM      Now, set up data and screen parameters.
200 REM      80-column alphanumeric mode is used.
```

(Continued)

Figure 3: A sample program using FULSCRN in BASIC.

serve as a model of direct screen update techniques for those who want to develop a more powerful screen manager.

Graphics Techniques

You can use FULSCRN in graphics modes by changing the dimension of the SCRN\$ array to 200 and putting the appropriate graphics data in it. In graphics modes, the display memory is divided into two halves. The half with the lower addresses supplies data for even-numbered scan lines (0,2,4 . . . 198), while the upper half supplies data for odd-numbered lines (1,3,5 . . . 199). Each 80-byte string in the SCRN\$ array represents one display line. SCRN\$(1) thus represents the top line, while SCRN\$(101) represents the second line, and so forth.

In high-resolution graphics mode, each

byte of the SCRN\$ array represents 8 bits of graphic data. The high-order bit of each byte represents the leftmost of a group of eight dots on the screen. Because there is only one bit of data per displayed dot, each dot can only be on or off. The off color is black, but you may select the on color by placing a 4-bit value in the background color register at port address 3D9H. The normal 16 foreground/background color values will produce the usual colors when used in this way.

In medium-resolution color mode, each display dot is represented by 2 bits in the SCRN\$ array, the leftmost dot corresponding to the high-order bits of each byte. Each 2-bit couple identifies one of four colors of the current palette.

The PC offers two standard palettes: black, cyan, magenta, and white, and

MENU FOR YOUR EPSON

Now you can have full menu-based operation of all control functions of all of the Epson MX, FX and RX printers. **Printer Boss™** software lets you send all of the complicated control codes, in seconds, by making menu selections with a few simple keystrokes.

Select and deselect pica, elite, compressed, italic, enlarged, emphasized, doublestrike, underline, superscript and subscript for scores of different type faces. **Set** line spacing, right and left margins and skip-over-perforation. **Load** USA, France, Germany, England, Denmark, Sweden, Italy, Spain and Japan language sets. **Control** uni-directional, half-speed and proportionally-spaced printing. **Store and retrieve** 10 complete menu settings with a few keystrokes. Create ASCII files of data, corresponding to the stored menu settings, which can be accessed by or included in your own programs to set up the printer as required. **Emulate** the IBM-label printer for the IBM-PC, eliminating print-out problems with IBM-PC software and Epson FX printers. **Download** to FX printers five different **IBM character sets**, including graphics, screen and APL characters and greek symbols. **Print two-pass letter quality** on your FX at full text-mode speed, up to 10 times faster than with programs using graphics mode. **Print multi-page spreadsheets** as wide as you like, **sideways** on your paper, in a choice of five different type sizes. Or create a **printer buffer** of up to 32K. Ideal for **IBM graphics** software, or **screen dumps**, or printing text from **Wordstar**, **Lotus 123** or many other line programs.

Printer Boss™ for the IBM-PC and compatibles \$59.95. With Letter Boss™ letter quality or Sidekick™ sideways print option \$99.95. With both \$139.95. Visa, MC, or send check. Free info. Dealers welcome.

Printer Boss™

CONNECTICUT SOFTWARE
30 WILSON AVENUE
ROWAYTON CT 06853
203-838-1844

SIDEKICK IS NOT TO BE CONFUSED WITH SIDEWAYS A TRADEMARK OF FUNK SOFTWARE. PRINTER BOSS LETTER BOSS AND SIDEKICK ARE TRADEMARKS OF SPEER RESEARCH CORPORATION. WORDSTAR AND LOTUS 123 ARE TRADEMARKS OF MICROSOFT INT. CORP AND LOTUS DEVELOPMENT CORP RESPECTIVELY.

CIRCLE 317 ON READER SERVICE CARD

SPEEDY UPDATES

```

210 REM L$(N) is a line of data comprising the
220 REM Nth letter of the alphabet and attributes
230 REM for white characters on a black background.
240 REM
250 SCREEN 0,0,0: DIM L$(27), SCRN$(25)
260 ALPHA$="ABCDEFGHIJKLMNOPQRSTUVWXYZ "
270 FOR JX=1 TO 27: A$=MID$(ALPHA$,JX,1)+CHR$(7)
280 FOR IZ=1 TO 6: A$=A$+A$: NEXT IZ
290 A$=LEFT$(A$,80): L$(JX)=A$+A$: NEXT JX
300 REM
310 REM Generate and display screens of data.
320 REM Each screen is 25 lines of data from L$.
330 REM Each string in SCRN$ must be initialized
340 REM to 160 bytes so that LSET can be used to
350 REM fill it very rapidly. Using LSET also
360 REM avoids BASIC garbage collection delays.
370 REM
380 FOR IX=1 TO 25: SCRN$(IX)=L$(IX): NEXT IX
390 FULSCRN=VARPTR(SCREEN$(1)): FOR JZ=1 TO 27
400 FOR IZ=1 TO 25: LSET SCRN$(IZ)=L$(JZ)

```

Figure 3: A sample program using FULSCRN in BASIC continued.

black, green, red, and brown. If you use an RGB (direct drive) monitor, a third palette is available, although it is not described in the manuals. By setting bit 2 of the mode register to 1, you can override the normal palette selection to obtain black, cyan, red, and white. You may include the statement OUT &H3D8,14 in a BASIC program to activate palette 3, and the statement OUT &H3D8,10 to revert to the standard palette that was active before you switched to palette 3.

Discovery Unlimited

You can do much more with your display adapter than I can squeeze into one article. For example, a currently available communication package uses the color adapter to display 31 lines of 64 or more proportionally spaced alphanumeric char-

acters. It reduces the vertical frame rate to 57 Hz to compensate for the increased data capacity, and you must adjust the monitor's vertical size control to allow for the larger frame, but the visual result is quite excellent. In fact, the display screen looks quite unlike what you are accustomed to seeing on an IBM PC. Of course, a complete display support package must be included in the program, along with a substitute for the character ROM, so the programming requirements are quite substantial. But it can be done!

By reading PC manuals and other literature and then experimenting with PC functions, any reader with a bit of curiosity and some time to explore should be able to come up with new techniques for using the PC more effectively. I've only scratched the surface here. ■

A Tale of Two Modems

Although the evolution of micro communications may render separately marketed modems obsolete, for now, the POPCOM X100 and the PC:Intellimodem represent the state of the art.

Bizcomp and POPCOM are two names with about as much high-tech zing as you can put into the name of a computer-communications product. The names convey the flashy and easy-to-use image that the companies marketing these products are trying to project. Bizcomp is short for Business Computer Corporation. The latest product from this company is called the PC:IntelliModem. The POPCOM X100 is a new modem developed and marketed by a company with a long history in the modem business, Prentice Corporation.


Both Prentice's POPCOM X100 and the Bizcomp PC:IntelliModem are audio modems designed for use over ordinary telephone systems. They convert the relatively weak direct-current signals inside your PC into tones that can pass over the standard dial telephone lines. That func-

tion is technically simple; recognizable modems have been commercially available since the 1950s. To understand how these modems work, you first need to understand how modems have evolved since then.

In the 1970s, changes in FCC regulations joined with technological developments to make possible the introduction of direct-connection modems, which connect to the telephone line electrically. These replaced acoustical couplers, which exchanged audio tones with the handset of the telephone. In 1977, Dennis Hayes significantly advanced the state of the art in data communications by introducing the Hayes Micromodem. One model, the Micromodem 100, fits into the expansion slots of S-100 bus computers, and the Micromodem II fits into a slot in the Apple II. These internally mounted modems

could dial the telephone line on command from the computer and answer a ringing telephone line under computer control. The internal mounting feature eliminated the need for an RS-232C serial communications board in the computer, but it created the need for special software capable of controlling the modem by sending signals to it through the system bus.

In 1981, Hayes Microcomputer Products again set the standard in modems with the introduction of the Hayes Stack Smartmodem. The Smartmodem is an external modem that connects to the serial port of the computer through an RS-232C cable. But this modem contains a small microprocessor and a stored program that allow it to monitor the data coming from the computer and watch for special codes telling it to dial a number, answer the ringing phone line, hang up, and perform other



The POPCOM modem comes in both internally mounted and standalone versions. The external version pictured here can be hidden away under a desk or in a power strip. Note the rotating AC power connector.

setup and maintenance functions. The software designed for this modem can be very simple since it only has to send standard characters out of the serial port.

The Hayes Stack Smartmodem has become popular, and the Smartmodem operational commands are now used by a wide variety of modems. In 1983, Hayes introduced the Smartmodem 1200B, which is an internally mounted version of the Smartmodem 1200 for the IBM PC. This internal device operates identically to the standalone Smartmodem, but it occupies an expansion slot instead of being

connected through a serial port and cable.

Both the POPCOM and Bizcomp modems reviewed here perform essentially the same functions as the Hayes Smartmodem. They contain microprocessors and control programs, dial the phone in response to commands from the computer, and answer the ringing telephone line under control of the computer. With the proper software, both modems can operate unattended. The POPCOM X100 is designed to be permanently plugged into the electrical socket, the telephone line, and the computer. (A recently announced POPCOM C100, which I did not test, is mounted on a circuit board that fits into one of the expansion slots in the PC.) The Bizcomp PC: IntelliModem is mounted internally in the computer and has connections to the telephone system.

So far, all the capabilities described could be found in any of several modems from VenTel, Novation, or Hayes. Familiarity with a typical data communications session between two people using microcomputers and standard modems will help you understand what make the POPCOM X100 and the PC: IntelliModem special.

Assume that I wanted to send a file containing the text of an article to *PC Magazine*. Even with prior arrangements, I would probably first call an editor on PC's technical staff and talk to him by voice to ensure that his PC was ready to accept data. We would talk about the size of the file, the protocol the communications pro-

grams use, and what he will do with the data diskette when the transfer is completed. After this discussion, I would hang up and dial into PC's system. If there were any problem during the transfer (say the data diskette fills up with my endless prose), I would have to terminate the data call, hang up, and call back on the voice number. All of this dialing and redialing is time consuming and expensive. The POPCOM and Bizcomp modems allow you to switch between voice and data calls without hanging up and redialing—if you have one of these modems at both ends of the circuit. This voice/data feature is an incremental gain in the state of the art for modems. Of course, a closer look at the POPCOM and Bizcomp modems will expose differences between them, too.

POPCOM X100

The housing of the POPCOM X100 modem is streamlined and functional. A rotating AC plug connection allows the modem to be plugged into the wall or into an extension cord or power strip. Cables for the telephone line and telephone plug into the bottom of the device. The small knob to control the volume of the internal speaker is the only physical control on the POPCOM X100; it has no lights to watch or switches to set. The device draws very little power from the wall socket and is always ready to go to work. The modem plays a little tune to signal that it is happy with the connections that have been made. It plays a tune for each connection and three times in a row to indicate good power, telephone, and computer connections. As an operational status message, the tune is pretty easy to interpret. (The internally mounted POPCOM C100 fits into an expansion slot and takes its power from the computer, but it operates in exactly the same way as the standalone version.)

The POPCOM operates in several modes. If you want it to emulate a Hayes Smartmodem, send it a single setup command and it will act as a Smartmodem until it is reset. If you want even more control and flexibility, select the POP-



POPCOM X100

Prentice Corporation
266 Caspian Dr.
P.O. Box 3544
Sunnyvale, CA 94088
(408) 734-9855

List Price: \$475 for standalone unit;
\$495 for C100 internally mounted unit.

Requires: X100 requires RS-232C port; C100 requires PC bus slot.

Capabilities: Bell 212A signaling; 1200 and 300 baud. Auto-dial, auto-answer, voice/data switching.

CIRCLE 795 ON READER SERVICE CARD

When you're last to the party, you better bring something special. Like a 10 Megabyte Winchester for \$888.

Hard Right

You could safely say we are just about last to the Winchester add-on party. For two years we have searched for the right components at the right price. Anybody can buy controllers and drives, make up a name, and presto, they are in the hard disk business. But to do it right, takes much more than just bundling the nearest components.

Anybody Want a V-8?

Adding a hard disk to an IBM PC can be very much like stuffing a V-8 engine in the back seat of your VW bug. There is room to put it there, and you will have one fast beetle—but you create a whole new set of problems. Like excessive power drain which results in heat.

Cool & In Control

Qubie' has attacked the power/heat problem with a state of the art controller and drive that draw less power than any on the market today. Start with our controller. It is three times faster than the controller in the IBM PC/XT. The controller uses LSI (Large Scale Integration) technology to lower the number of components on the board. Fewer components require less power. Less power means less heat. More power left for other expansion boards, and lower operating temperatures inside your PC. Don't forget our

low power drive. It draws the same amount of power as a floppy disk, and is the lowest power consuming drive on the market today.

Sitting Or Standing

Since PC's seem to be getting more and more portable we decided we selected a drive that can be used in the desktop or portable PC. Our drive uses plated media. Plated media can stand up to the rigors of the real world. Special design of the drive allows it to operate at any angle. No need to treat your PC like a piece of antique china just because you have added a hard disk.

Complete Package

Included in the package is everything you need to install it yourself. A 10mb Winchester drive, controller, cables, mounting hardware, and step by step instructions to explain the installation. You can use PC-DOS version 2.0 or 2.1 without any modifications.

Why Buy From Us

Because besides having the best hard disk system on the market, we stand behind it and you. You get direct technical support after the sale. If at any time during the one year warranty period your system should require service, we will fix it or replace it within 48 hours.

Notice there are no hidden charges in our

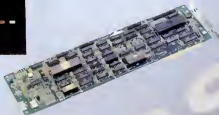
price. No extra for freight, credit cards, COD fees, or insurance. If you still are not convinced, and are ready to buy another brand of hard disk, ask them if they will take our acid test.

The Acid Test

Qubie' gives you a 30 day satisfaction guarantee on our hard disk system. If for any reason you are not satisfied with your purchase, you may return it for a complete refund including the postage to return it. If you can, get any of our competitors to give you the same guarantee. Buy both and return the one you don't like. We know which one you will keep.

Qubie' PC10 with 10 Megabyte hard disk, controller, cables, installation hardware, and instructions. 1 Year Warranty. \$888

IBM is a trademark of International Business Machines Corporation



**Plated Media for
Rugged Performance**

Order Today, Shipped Tomorrow!

All prices include UPS surface freight and insurance. Add \$12 for two day air service. For fastest delivery send certified check or credit card. Personal checks take 18 days to clear. Calif. residents add 6% sales tax. Corporations and Institutions call for purchase order details.

(800) 821-4479

Toll Free Outside California

(805) 987-9741

Inside California

QUBIE'

4809 Calle Alto
Camarillo, Ca. 93010

Tempo House, 15 Falcon Road,
London SW11 2PH, United Kingdom

Copyright Qubie' 1984
CIRCLE 384 ON READER SERVICE CARD

The TeleVideo

The best hardware



TeleVideo versus IBM. Make a few simple comparisons and you'll find there is no comparison.

RUNS IBM SOFTWARE.

With the TeleVideo® IBM Compatible line—PC, XT and portable computers—you'll get the most out of all the most popular software written for the IBM® PC—more than 3,000 programs.

Because every TeleVideo Personal Computer offers the highest level of IBM compatibility on the market and

THE BEST HARDWARE FOR THE BEST PRICE.

Features	Tele-PC	IBM PC	Tele-XT	IBM XT
Monitor	YES	OPTIONAL	YES	OPTIONAL
Screen Size	14"	12"	14"	12"
Tilt Screen	YES	NO	YES	NO
Quiet Operation	YES (NO FAN)	NO	YES	NO
Memory	128K	128K OPTION	256K	256K OPTION
Graphics Display (640 x 200 resolution)	YES	OPTIONAL	YES	OPTIONAL
Printer Port	YES	OPTIONAL	YES	OPTIONAL
Communications Port	YES	OPTIONAL	YES	YES
MS™ DOS/BASIC®	YES	OPTIONAL	YES	OPTIONAL
System Expansion Slot	YES	YES	YES	YES
RGB and Video Port	YES	OPTIONAL	YES	OPTIONAL

PC compatibles. for the best software.

has the standard—not optional—features you need to take full advantage of every job your software can do.

Study the chart below. It proves that TeleVideo—not IBM—offers the best hardware for the best price.

Note that TeleVideo's ergonomic superiority over IBM extends from fully sculpted keys and a comfortable palm rest to a 14-inch, no glare screen that tilts at a touch.

THE BEST MICROCHIPS.

What is perhaps most impressive about the TeleVideo IBM PC Compatible can be found deep within its circuitry. We use the same 8088 central processing unit that runs an IBM PC. But we also employ new VLSI (Very Large Scale Integration) microchips that are designed and built exclusively for TeleVideo. These interface more efficiently with the powerful 8088 and yield numerous benefits.



For example, our tiny custom chips do the work of many of the larger, more expensive circuit boards in an IBM PC. So we can offer a computer system that comes in one attractive, integrated case, is ready to run and occupies less desk space. A computer that edges out IBM's added-cost component system for reliability, ease of service and purchase simplicity.

Fewer circuit boards to cool also allowed us to eliminate the noisy, irritating fan IBM and most other PCs force you to put up with. And TeleVideo compatibles accept



THE BEST PORTABLE FOR THE BEST PRICE.

Features	TPC II-S	IBM PC
High Capacity Storage	YES	YES
Quiet Operation	YES (NO FAN)	NO
Display	YELLOW	AMBER
Memory	256K	256K
Graphics	YES	YES
Communications Port	YES	OPTIONAL
Printer Port	YES	OPTIONAL
MS [®] DOS 2.11	YES	OPTIONAL

any IBM hardware options without modification.

THE BEST LINE.

But the Tele-PC is only one element of the TeleVideo IBM PC Compatible line.

The TeleVideo XT is the best hardware for users of popular IBM XT software who would appreciate an extra 10 megabytes of storage capacity along with the advantages listed on the chart at the left.

As the chart above demonstrates, our portable IBM compatible computer, the TPC II, is far and away better hardware than IBM. Better hardware—standard—at a better price.

THE BEST MANUFACTURER.

The TeleVideo IBM PC Compatible line is made by the world leader in multi-user computer systems and the number one independent manufacturer of terminals.

Call 800-538-8725 for the dealer nearest you. In California, call 800-345-8008.

Before you invest, make a few simple comparisons. You'll find that TeleVideo—not IBM—has the best hardware for the best software. At the best price.

IBM is a registered trademark of International Business Machines. MS is a trademark of Microsoft Corporation. CW Basic is a registered trademark of Microsoft Corporation.

TeleVideo[®]
Personal Computers
© TeleVideo Systems, Inc.

CIRCLE 347 ON READER SERVICE CARD



YOUR PC CAN BE YOUR NEXT SMART TERMINAL.

SmarTerm software can make your personal computer a lot more intelligent than it really is.

Our terminal emulators have the features that do the job: Full keyboard emulation. Multiple setups. TTY mode. "Smart" softkeys. Printer support. Help screens. And a friendly user manual.

Built-in text and binary file transfer is powerful and simple to use, and does not require

any special host software. SmarTerm also features automatic file transfer and two different "error-free" protocols, including XMODEM.

There's a SmarTerm emulator that matches your needs: SmarTerm 100 for emulation of DEC VT100, VT102 and VT52. This program now features 132-column display mode support, using either horizontal scrolling or special 132-column video display boards. SmarTerm 125 includes all the features of

SmarTerm 100, plus VT125 ReGIS graphic support. SmarTerm 400 for emulation of Data General Dasher D100, D200 and D400.

More than 10,000 customers have discovered just how smart their PCs can be with SmarTerm. We think you'll agree. Try it for 30 days with full refund privilege.



Call today for more information.

Available through your local software dealer, or Persoft, Inc., 2740 Ski Lane, Madison, WI 53713. Phone (608) 273-6000. TELEX 759491.

SMARTTERM is a trademark of Persoft, Inc. • DEC & VT are trademarks of Digital Equipment Corp. • Dasher is a trademark of Data General Corp. • IBM is a registered trademark of International Business Machines, Inc.

IN A WORLD OF CHANGE, THE SMART GET SMARTER™



persoft

CIRCLE 107 ON READER SERVICE CARD

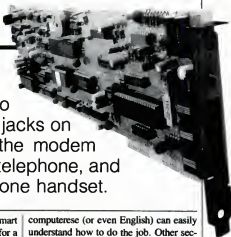
TWO MODEMS

COM standard mode. In this mode, the POPCOM can send you error and status messages telling you that the modem on the other end is going too fast or too slow, that it has received a busy signal, or that it hears something that sounds like a human voice.

A few commands set 19 different operating parameters in the POPCOM, including the code used to get the POPCOM's attention when it is on line, how long it will wait for a data connection to be established, and how long it will wait before hanging up if the data call is somehow disrupted. This latter feature comes in handy for those with "call waiting" on their telephone lines. Call waiting is an optional feature offered in some parts of the country that signals you with a sharp crackling sound on the line when someone else is attempting to reach you. You can talk to the second caller by pressing the switch-hook and then return to the first caller by pressing it again. Unfortunately, the crackling sound almost always causes a typical modem to think it has lost the signal from the other end and to immediately hang up. But by extending the POPCOM's carrier-off hang-up delay, you may be able to restore communication. You will have lost some characters in the process, but software with error detection and retransmission capabilities will correct this problem.

The POPCOM's ability to detect whether a dial tone is present is another nice feature. Most modems with a dialing capability simply wait a few seconds and then dial. They assume the presence of a dial tone. The POPCOM dial-tone detection feature is important when you are using a shared telephone system and must dial 9, then wait for another dial tone before proceeding. It may become even more important in light of the proliferation of alternative telephone services as a result of the divestiture of AT&T and the introduction of competition into all areas of the telephone industry. These alternative telephone services may have widely varying delays before providing a dial tone. They

The Bizcomp PC: IntelliModem plugs directly into the PC. The three jacks on the near side of the modem attach to the line, telephone, and an optional telephone handset.



are likely to require a system that is smart enough (and patient enough) to wait for a dial tone before dialing.

The voice/data switch on the POPCOM may be its best feature. If both ends of the connection have POPCOM devices, you have only to pick up the telephone attached to the modem and start talking. When the POPCOM at the other end loses the data signal, it will turn on its speaker and the other person will hear your voice. Lifting the receiver at that end turns off the speaker. When you put the phone back on hook, the POPCOM tries to re-establish the data connection, unless it receives a command from the computer. In case you finish a data call but forget to tell the modem to hang up, the POPCOM will hang up if the data connection is not re-established within 30 seconds.

Software and Support

The POPCOM works well with practically any data communications program—from the simplest to the most complex. I used the POPCOM with PCModem, Crosstalk, and Smartcom II. In every case the modem performed up to the full capabilities of the software. The data/voice capability worked well, and the modem responded in either its normal mode or its Hayes-emulation mode.

The POPCOM's manual includes some descriptive diagrams and several quick-reference guides. The instructions for connecting the modem are carefully illustrated to the extent where persons not fluent in

computerese (or even English) can easily understand how to do the job. Other sections of the manual describe how to set the optional POPCOM functions and how to troubleshoot the complete communications system. The manual lacks both a glossary and an index, but it has a good table of contents.

Prentice Corporation maintains and advertises a telephone consultation service for POPCOM users. The manual includes a troubleshooting card to fill out before calling the service. (Many problems with modem systems involve cables and connections and are relatively easy for an experienced person to diagnose.) The manual also includes desirable features such as a "crib sheet" with a condensed list of modem commands and a pop-out notice you can put on a telephone to deter



PC: IntelliModem
Bizcomp (Business Computer Corporation)

532 Mercury Dr.
Sunnyvale, CA 94086
(408) 733-7800

List Price: \$499 (includes PC: IntelliModem software)

Requires: 64K RAM, IBM BASIC, one disk drive, 80 one-column display.
Capabilities: Bell 212A signaling; 1200 and 300 baud. Auto-dial, auto-answer, voice/data switching.

CIRCLE 796 ON READER SERVICE CARD

PC NETWORK

BUY HARDWARE AND SOFTWARE AT WHOLESALE +8%, AND GET 12-21 DAY SOFTWARE RENTALS†...

Join the thousands of buyers who have saved more than \$8,000,000.00 on over 25,000 orders in just the last six months.

The nation's largest corporations depend on PC NETWORK!

On our corporate roster are some of the nation's largest financial industrial and professional concerns including:

AT&T	General Mills
Berlachs Bank	Harvard University
Bell & Howell	Hughes Aircraft
Chibank	National Opinion
Columbia University	Research Center
Farm Bureau Insurance	Standard Oil of Ohio
Frontier Airlines	University of Chicago
GATX Corporation	Veteran's Administration
	Hospitals

plus thousands of satisfied consulting firms, small businesses, computer clubs, user groups, municipalities, government agencies and value-added individuals ACROSS THE NATION! Their buyers know that purchasing or renting from PC NETWORK saves them time, money and trouble. They also count on us for product evaluation, professional consultation and the broadest spectrum of products and brands around.

CALL TOLL FREE 1-800-621-S-A-V-E

In Illinois call (312) 280-0002

Your Membership Validation Number: A188

You can validate your membership number and, if you wish, place your first money-saving order over the phone by using your VISA, MASTERCARD or AMERICAN EXPRESS. Our knowledgeable service consultants are on duty Mon-Fri 8 AM to 7 PM, SAT 8 AM to 5 PM CST.

PERSONAL COMPUTER NETWORK

329 West Ohio

Chicago, Illinois 60610

Call now...join the PC NETWORK and start saving today!

PC NETWORK • MEMBERSHIP APPLICATION

YES, Please enroll me as a member in the PC NETWORK and rush my catalog featuring thousands of computer products, all at just 8% above DEALER WHOLESALE PRICES. I will also periodically receive "THE PRINTOUT", a special up-to-date on merchandise at prices BELOW even those in my wholesale catalog, and all the other exclusive, money-saving services available to Members.

195

I am under no obligation to buy anything. My complete satisfaction is guaranteed. Please check ☒ all boxes that apply.

Basic Membership	Special V.I.P. Membership*
<input type="checkbox"/> One-year membership for \$8	<input type="checkbox"/> One-year membership for \$15
<input type="checkbox"/> Two-year membership for \$15 (SAVE \$1)	<input type="checkbox"/> Two-year membership for \$25 (SAVE \$5)
<input type="checkbox"/> Business Software Rental Library for \$25 add'l per year—with 12 day rentals	<input type="checkbox"/> BOTH Business and Game Software Rental Libraries for \$30 add'l per year—with 21 day rentals
<input type="checkbox"/> Games Software Rental Library for \$10 add'l per year	

*V.I.P. members receive advance notice on limited quantity merchandise specials

☐ Bill my credit card ☐ VISA ☐ MASTERCARD ☐ American Express

Account Number:

Exp. Date: mo. year

☐ Check or money order enclosed for \$

Name: Apt No.

Address:

City: State: Zip:

Telephone: ()

Please provide the following information to insure compatibility with your system (check all boxes that apply):

My computer(s) is ☐ IBM PC ☐ Apple II ☐ TRS-80 ☐ Kaypro

☐ Other:

Signature:

(Signatures required to validate membership)

Copyright ©1984, PC NETWORK INC.

Listed below are just a few of the over 20,000 products available at our EVERYDAY LOW PRICES! All software below is priced in IBM-PC format.

PC NETWORK'S SPECIAL SOFTWARE

(Prices include \$1 shipping and handling for each title ordered from below.)

Atari-8000 Air Traffic Controller	\$19.95	Atari-8000 Chess (Four Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95
Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95
Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95
Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95
Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95
Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95
Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95
Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95
Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95	Atari-8000 Chess (Two Player Opponent)	\$19.95

BUSINESS SOFTWARE

(Prices include \$1 shipping and handling for each title ordered from below.)

ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95
ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95
ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95
ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95
ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95
ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95
ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95
ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95
ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95	ATI How to use Multitask	\$49.95

HARDWARE

(Prices include shipping and handling charges listed in dollars next to prices.)

Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)
Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)
Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)
Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)
Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)
Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)
Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)
Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)
Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)	Apple Macintosh IIx System	\$1,249.00 (\$1,269.00)

DRIVE DISKS & CONTROLLERS

Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)

MEMORY CHIPS

ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)

MODEMS

Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)

MONITORS

Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)
Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)	Apple II Disk II Low Power Hard Drive	\$199.00 (\$199.00)

VIDEO CARDS

ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)

ACCESSORIES AND SUPPLIES

ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)
ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)	ATI Memory Upgrade Kit (4 Chips)	\$6.99 (\$1.00)

RENT BEFORE YOU BUY—Members are eligible to join the NETWORK's Business and Game Software Rental Libraries and evaluate products for a full 12 (Regular) or 21 (VIP) days to see if it meets your needs. And the NETWORK's rental charges are far less than other software rental services—JUST 20% OF THE MEMBER WHOLESALE PRICE!

Hardware prices highlighted by — reflect recent major price reductions

... AS A PC NETWORK MEMBER ONLY!

COMPLETE IBM™ PC SYSTEMS

IBM PC STARTER SYSTEM

IBM PC w/64K

\$1,940.00* (48.00)

(256K System Board Capacity)

Flippy Drive Controller
2 Double Sided Double Density 320/360K Disk Drives
Hercules Color Card with Parallel Port
Zenith ZVM123 High Res Monochrome Monitor

The NETWORK has the perfect starter system for you! The combination of double sided disk drives and a color card enable you to run ANY program—from games and educational software to the most sophisticated business applications.

REFLECTS
IBM'S
REDUCTION!

IBM PC PROFESSIONAL HARD DISK SYSTEM (XT)

IBM PC w/128K

\$2,675.00* (62.00)

(256K System Board Capacity)

1 Double Sided Double Density 320/360K Disk Drive
for Addition of Tape Backup in PCI
Zenith ZV123 High Res Monochrome Monitor

w/Excess Half Height Disk Subsystem:
Half Height 10Mb Drive Allows Room
for Addition of Tape Backup in PCI
Automatic Hard Disk Boot Feature

This system increases productivity in any business or professional situation. The 10Mb hard disk eliminates cumbersome floppy disk changes, simplifies operations and dramatically speeds program execution time. The NETWORK's buying power provides you with better than XT performance at a price lower than you'd expect to pay for a standard PC.

*PC Network Members pay just 8% above this wholesale price plus shipping. These prices have been prepared in June, 1984 and may have been changed with new product announcements. Call for latest prices.

REFLECTS
IBM'S
REDUCTION!

Custom Configurations

YOUR SYSTEM EXACTLY AS YOU WANT IT—With the NETWORK'S over 20,000 hardware and software products we can configure a system to your exact specifications ALL AT JUST 8% ABOVE THE DEALER WHOLESALE PRICE! Ask our trained consultants about any drive, monitor, multifunction card or any other component which will meet your unique requirements.

LATEST ISSUE REDUCTIONS!

As the NETWORK's volume grows our prices drop. The following popular products are now available at these new lower prices!

64K MEMORY EXPANSION KITS	\$ 43.20* set
Set of 9 chips. Guaranteed for Life.	
TANDON TM100-2 DRIVES	168.00* ea.
PANASONIC	275.00* pr.
1/2 Height Disk Drives with Mounting Kit	
AMDEK MONITORS	
V300G Composite Green	110.00*
V300A Composite Amber	120.00*
V310A IBM Amber	130.00*
HERCULES MONOCHROME GRAPHICS CARD	298.00*
HAYES 1200B	299.00*
Without Gopherware	
NEC 3550	1,460.00*
33 CPS Letter Quality Printer	
HAYES SMARTCOM/II	68.00*
Communications Package	
BRAND NAME DISKETTES	20.00*
DS/DD Box of 10. Guaranteed for Life	

*NETWORK members pay just 8% above these wholesale prices plus shipping.

... WITH THESE 15 UNIQUE BENEFITS

1 COST+ 8% PRICING—The NETWORK purchases millions of dollars in merchandise each month. You benefit in receiving the lowest price available and still at just 8% above published dealer wholesale prices.

2 OUR 400 PAGE WHOLESALE CATALOG—Members receive our 400 page wholesale catalog containing over 20,000 hardware and software products for the IBM PC, APPLE and over 50 other popular computer systems. The NETWORK'S CATALOG IS THE LARGEST SINGLE COMPILATION OF PERSONAL COMPUTER PRODUCTS AVAILABLE TODAY—ALL PRICED AT 8% ABOVE DEALER WHOLESALE.

3 EXPERIENCED CONSULTANTS—The NETWORK hires consultants, not order takers, to aid you in product selection. Our consulting staff possess in excess of 150 man years of personal computer product experience. We back our consultants with our money back guarantee. IF ANY PRODUCT RECOMMENDED BY OUR CONSULTING STAFF FAILS TO PERFORM AS PROMISED—OR IS INCOMPATIBLE WITH YOUR SYSTEM—WE WILL TAKE IT BACK AT OUR EXPENSE FOR A 100% REFUND.

4 IN-STOCK INSURED FAST HOME DELIVERY—The NETWORK maintains a giant multi-million dollar inventory of most popular products, allowing us to ship many orders from stock. Non-stock items are typically manufactured in local warehouses just days away from The NETWORK. We'll even pay full insurance expenses on all shipments. EMERGENCY OVERNIGHT SERVICE IS AVAILABLE ON REQUEST.

5 FREE TECHNICAL SUPPORT—The NETWORK supports every product it sells. We maintain a qualified TECH-SUPPORT staff to help you assemble your system, interpret vendor documentation and get your software and hardware to work. WE WILL GIVE YOU ALL THE HELP YOU NEED, WHEN YOU NEED IT—FREE!

6 OPTIONAL BUSINESS RENTAL LIBRARY—All members can join our BUSINESS RENTAL LIBRARY for just \$25 PER YEAR above the base membership fee. The entire cost to rent business software AT JUST 20% OF THE DISCOUNTED PRICE FOR A 12 DAY PERIOD. If you decide to keep the software, the entire rental fee is deducted from the purchase price. VIP MEMBERS GET A FULL 21 DAYS for just \$25 above the V.I.P. base fee. This also includes the game library privileges for a \$5 combination savings.

7 OPTIONAL GAME SOFTWARE RENTAL LIBRARY—The Game Rental library is available to members for just \$10 PER YEAR and permits evaluation (or just enjoyment) of any game or educational software product as above.

8 SPECIAL SAVINGS BULLETINS—THE PRINTOUT—The NETWORK saves every opportunity to save money for its members. We buy surplus, overstock, and store bankruptcy closeouts regularly. We then turn around and make this merchandise (only top quality name brand products) available to our members at fantastic savings via THE PRINTOUT, our newsletter and savings bulletin.

9 DISCOUNT BOOK LIBRARY—Working with numerous publishers and distributors, the NETWORK has assembled a library of over 1000 computer related books and manuals at savings of up to 75% from the normal store price.

10 MEMBERSHIP REFERRAL BONUS—Our most valuable source of new members is you! To date almost 40% of our members have been referred by word of mouth from other satisfied members. For those of you who refer new members, the NETWORK will credit a cash bonus to your account applicable to any future purchase.

11 CORPORATE ACCOUNT PROGRAM—Almost 50% of The NETWORK's members are corporate buyers and users (see opposite page left). The NETWORK can establish open account (P/O) status and assign designated account managers to expedite orders, and coordinate multiple location shipments.

12 QUANTITY DISCOUNTS—For large corporations, clubs, and repeat or quantity buyers The NETWORK can extend additional single order discounts, when available to us from manufacturers and distributors. The NETWORK looks for every opportunity to save you money.

13 SOFTWARE PUBLISHING ASSISTANCE—The NETWORK reaches tens of thousands of members regularly through its catalog and newsletter. For those of you who have created marketable software we will lend you our clout with our members, software publishers and distributors to get your material evaluated and circulated.

14 MEMBERSHIP SATISFACTION GUARANTEE—If for any reason you are not satisfied with your membership within 30 days, we will refund your dues IN FULL.

15 PRODUCT SATISFACTION GUARANTEE—If you are not satisfied, for any reason with any hardware component purchased from The NETWORK within 180 days of receipt, we will refund your entire purchase (less shipping) with no questions asked.

CALL TOLL FREE 1-800-621-S-A-V-E (orders and membership)
In Illinois call (312) 280-0002 validation code A795 only

TWO MODEMS

people from picking up the telephone handset while the POPCOM is in use.

Taken as a whole, the POPCOM represents a major step forward for modems.

The data/voice feature is useless for communicating with host computers or information utilities such as CompuServe and Dow Jones, but it's truly invaluable for

exchanging data between microcomputers operated by people. Even without the data/voice feature, the POPCOM's packaging and price make it an excellent value.

Microshop

COMPUTER PRODUCTS

Low Prices * Low Prices * Low Prices * Low Prices

MONITORS

Amdek 300	\$139.00
Amdek 300A	\$159.00
Amdek 310A	\$179.00
Amdek Color I	Best Price
Amdek Color II	Best Price
PGS - HX - 12	Best Price
PGS - MAX - 12	Best Price
PGS - SR - 12	Best Price

PRINTERS

Epson FX 80	\$499.00
Epson FX 100	\$699.00
Okidata 92 A	\$465.00
Okidata 93 A	\$765.00
Okidata ML 84	\$950.00
Okidata 2410	Best Price
Toshiba P1351 & 1340	Best Price
NEC Spewriters 3550	\$1850.00
NEC Spewriters 7730	\$1999.00
C-Itch Sterewriter 40CPS	Best Price
C-Itch Printmaster 55CPS	Best Price
Also available DX-15, HR-25, HR-35 & Starmicroics	

DRIVES

Tandon TM 100-2	\$215.00
Slifline Drives - Your Choice - Toshiba, Hitachi, Pinecnic	\$189.00

IBM PC INDIVIDUALLY CONFIGURED CALL FOR LOW PRICES MULTIFUNCTION BOARDS

AST I/O +Ser & Par	\$179.00
AST Six Pack 64K	\$269.00
AST Mega Plus 64K	\$269.00
AST Combo 64K	\$269.00
Quadboard 64K	\$269.00
Hercules Graphic	\$359.00
Plantronics	Best Price
Paradise Multifunction Card	Best Price
Orchid - Blossom	Best Price
64K Ram Upgrade Kit	\$50.00

MODEMS

Hayes Smart Modem 1200	Best Price
Hayes Smart Modem 200	Best Price
Hayes 1200B Plug in Modem Card	Best Price

HARD DISK FOR IBM PC

10 MB Hard Disk Sub System includes Software, Controller Cables, etc	
Internal	\$999.00
External	\$1099.00

Many other products available, Please call for low - low prices!

Microshop

2640 Walnut Ave., Unit K, Tustin, CA 92680
(714) 838-7530, 838-7531, 838-7532
(714) 838-9503, 838-9504

Prices & availability subject to change without notice
IBM PC is a registered trademark of IBM Corp.

PC: IntelliModem

The Bizcomp PC: IntelliModem is contained on a circuit card that fits into a full-size PC expansion slot. The modem takes its power from the PC, and a red LED glows when the power connection is complete. The modem board has jacks for the telephone, telephone line, and an optional telephone handset you can plug in to allow you to use the computer as an expensive electronic dialer. The circuit board is well constructed and the major components have sockets allowing easy replacement. The modem board works with software that addresses either serial port 1 or 2 on the PC. The selection is made by changing the insertion of an 8-pin header plug into one of the sockets on the board. This port selection cannot be changed without removing the board from the computer.

Unfortunately, the Bizcomp PC: IntelliModem does not use the standard Hayes Smartmodem instruction set. Instead, it responds to a unique set of commands designed by Bizcomp. In this command set, you must tell the modem the baud rate, speaker status, and type of dialing to be used for every call. This information is contained in a string of characters entered before the number to be dialed. Another negative feature is that the command structure does not allow you to back up and edit the line if you make an error. You have to abort the line and start over. This isn't much of a problem with a good communications program that automatically sends the correct characters to the modem, but if you enter the data manually, you must be careful not to make a mistake.

PC: IntelliModem Software

Bizcomp supplies its own data communications software, called PC: IntelliCom, with the PC: IntelliModem. PC: IntelliCom is written in IBM BASIC, so its operation cannot be guaranteed on anything other

TWO MODEMS

than a true-blue IBM PC. The software is nicely integrated with the modem and makes extensive use of the PC's function keys. The Bizcomp program captures incoming data to files it creates on the program disk. These files can later be renamed and transferred to another disk, but they must go to the program disk first. Data are stored in a RAM buffer created by the program. When the buffer is full, the program writes the data to the disk. The manual does not describe this feature in detail, but if the system sending you data is not capable of stopping the transmission when it receives an XOFF command, you will lose data while the program is writing to the disk. The PC: IntelliCom software cannot make file transfers using common error detection and block retransmission arrangements such as the *Crosstalk* or *X-Modem* protocols.

PC: IntelliCom does, however, allow you to change the operation of the modem between the voice and data modes. If you are in the data mode, you select the voice mode by pressing the F2 key. If you are in the voice mode, you select the data mode by pressing either the F1 key to turn on the modem that uses the originate tones or the F2 key for the answer tone set. But if you are already in the data mode, pressing the F1 key hangs up. This creates the potential for interrupting a call by accident, resulting in the loss of data or the waste of an expensive telephone call. I would rather have seen one key dedicated to this function or have it backed up with a safety question (such as, "Are you sure?"). Instead, the function keys are re-used in many different ways during the setup and operation of the program. For example, in addition to the problem described above, the F1 key is also used to select the originate mode, select between tone and pulse dialing, select the baud rate, and return to the main menu.

Data and Voice

Switching between data and voice transmission modes is more complicated on the PC: IntelliModem than on the POP-

COM. If the PC: IntelliModem loses the signal from the other end, it prints a message on the screen telling you that it has lost the signal. Then it waits about 20 sec-

onds, and if you have not selected the voice mode by pressing F2, it unceremoniously hangs up. The manual does not indicate any method of changing this wait-

THIS IS IT!



HARD DISK CONTROLLER SUBSYSTEMS for

or complete IBM® PC and T[®] PROFESSIONAL Computers

Whether you use MINSERVE, SEAGATE, SHUGART, TANDON, DISKTRON, SYQUEST, MAXTOR or others with ST505 compatible interface, this is the ONLY BOARD you need.

It plugs right into the IBM PC, and features:

- ECC generation/check/correction
- CRC generation/check
- Up to 4 disk drives
- Write-protect each drive individually
- CARTRIDGE CHANGED, CHANGE CARTRIDGE lines are provided to allow use of cartridge type disk drives
- Compatible with 140 Mbyte MAXTOR drive
- Programmable track format: data length is variable from 128 - 1024 bytes/sector
- Data transfer rate 5 Mbyte/sec
- Multiple sector transfer
- DMA Data transferring

For **IBM PC[®]**

Dealer's inquiries invited.
Competitive Pricing

For more information contact:
HARD DISK SUBSYSTEM AVAILABLE

ZOBEX

10945-A WHEATLANDS AVE. • SANTEE, CA 95071 • (415) 868-8308

ZOBEX IS A TRADEMARK OF ZOBEX CORPORATION

IBM IS A TRADEMARK OF INTERNATIONAL BUSINESS MACHINES CORPORATION

© 1984 ZOBEX CORPORATION

CIRCLE 230 ON READER SERVICE CARD

TWO MODEMS

ing time or any other internal parameters. You must vigilantly watch the screen to know that someone at the other end has switched to voice and is trying to talk to

you. If the switch is made by mutual arrangement, the transfer is easy. But if you think a file transfer is underway and fail to watch the screen, you could miss

the loss-of-signal message until it is too late.

The POPCOM and the PC: IntelliModem can work together on the same circuit and move between voice and data transmission. If the connection starts out in the voice mode, the POPCOM user has only to hang up. If POPCOM has a valid computer connection, it will go into the data mode. The PC: IntelliCom user hangs up the phone and pushes the F1 key to establish a data connection. If the connection moves from data back to voice, the PC: IntelliModem user will have to watch the screen to catch the switch, while the POPCOM user will hear what is happening since the POPCOM speaker is activated as soon as the data signal has stopped.

Other Software

Other software, such as *Crosstalk*, will control most, but not all, of the functions of the PC: IntelliCom modem. *Crosstalk* gives you the capability to load the needed dialing and setup commands into a file that can be automatically transmitted to the modem. In this case, the modem must always communicate with the software at 1200 baud, regardless of the speed the modem is using to communicate with the outside world. This means that the speed-selection option on the menu of *Crosstalk* and similar programs cannot control the speed of the communications. To control the speed, special characters must be sent to the modem as a part of the dialing commands.

A greater problem is the inability of programs other than PC: IntelliCom to switch the Bizcomp modem between data and voice. While it may be possible to use an advanced program such as *Omniterm II* to toggle the status line (data terminal ready) that controls the switch between voice and data, it would require a high degree of technical sophistication. Essentially, you must choose between the voice/data switching capability of PC: IntelliCom or the error-detection and correction capability of *Crosstalk* or similar software. The choice is complicated by the

Winchester power for your PC



The proven Winchester subsystem drives for your IBM or compatible PC. 10, 15, 25, or 33 megabytes of big system storage in a DiskSystem™ you simply plug into your system and it's ready to use. At prices that make the speed and storage of a Winchester practical. Only \$1495 for a 10 megabyte DiskSystem, \$1795 for 15 megabytes, \$2245 for 25 megabytes, or \$2795 for 33 megabytes. DiskSystems can be bootable from the Winchester. See your dealer today for DiskSystem power for your PC.

I² Interface Inc.

51101 Osborne Street
Caroga Park, CA 91304
(818) 341-7914 • Telex 660949

Dealer Inquiries Invited

DiskSystems is a copyright of Interface Inc. IBM is a registered trademark of IBM Corporation. Prices are suggested retail and are subject to change without notice.

Dealer Inquiries Circle 186 on Readers Service Card
End Users Circle 187 on Readers Service Card.

fact that the situations calling for data/voice switching capability are often the same ones that could use protocol file transfers. Both of these features are useful during microcomputer-to-microcomputer communications and not during microcomputer-to-host computer sessions.

The Bizcomp manual does an adequate job of describing the installation of the modem, but the majority of it is devoted to the use of the PC: IntelliCom software. The manual contains installation diagrams and a table of contents, but no glossary or index. Surprisingly, the telephone number of the company did not appear anywhere in the manual.

State of the Art

While both the POPCOM X100 and the Bizcomp PC: IntelliModem represent aspects of the state of the modem art, the definition of what is truly modem in this market changes quickly. In fact, it is fairly easy to predict the coming demise of modems as separately marketed devices. Two factors are working to make them obsolete: First, modems are becoming integrated into personal computers; and, second, telephone systems are being digitized. Firm evidence of the trend toward modems becoming an integrated part of microcomputers and terminals is presented by the inclusion of modems in the Radio Shack Model 100 and the IBM PCjr. The Radio Shack Model 100 portable computer comes with its modem permanently installed. The PCjr's modem is marketed as an option, but a special internal slot is provided just for the operation of the modem. Neither of these modems operates at 1200 baud, but advances in large-scale integration techniques such as those evidenced by Prentice in the POPCOM are reducing the size and cost of 1200-baud modems. They will likely be the next step in built-in modems.

The second major trend working against separately marketed modems is the introduction of digital private branch exchange (PBX) telephone systems into the offices of large and small businesses

and corporations. Modern digital telephone systems often include an RS-232C jack on each telephone, which can be used to directly connect a microcomputer or

other terminal device into the telephone system. The conversion between the digital signals from the computer or terminal and the analog national telephone system



Btrieve™

Network and single-user file management for all your programs. All your programming languages.

Say goodbye to writing file management routines. Because now Btrieve™ can handle file management for all your program development on the IBM PC. All your programming languages.

Based on the b-tree file indexing system, Btrieve provides the most sophisticated file handling powers available for your PC. And for multiple PCs. Btrieve™/N lets you share files among PCs in NetWare™, PCnet™, EtherSeries™, or MultiLink™ networks. And both Btrieve and Btrieve/N offer the same superior performance characteristics:

- Interfaces all major IBM PC languages—BASIC, Pascal, COBOL, C, and IBM Macro Assembler

- Written in 8088 Assembler for the IBM PC
- Multikey access to records
- Automatic file recovery on system crash.

Btrieve and Btrieve/N also have user-defined transaction management. Unlimited number of records per file. Complete error control and recovery within an application. Duplicate, modifiable, and segmented keys. Variable cache buffer from 16K bytes to 64K bytes.

Moreover, record retrieval is fast with Btrieve—no matter how large your data base. So you can begin writing programs faster with Btrieve.

Say goodbye to file management routines. And hello to Btrieve.



SoftCraft Inc.

P. O. Box 9802 #590 Austin, Texas 78766 (512) 346-8380

Suggested retail prices: Btrieve, \$245; Btrieve/N, \$595. Requires PC/DOS or MS™/DOS, version 1 or 2. Dealer inquiries welcome.

IBM, MS, Btrieve and Btrieve/N, PCnet, MultiLink, NetWare, and EtherSeries are trademarks of International Business Machines, Microsoft Corporation, SoftCraft Inc., Oracle Technology, Dising Systems Inc., Novell Data Systems, and Xcom Corp., respectively.

Introducing AST-PCnet II.



Now PC networking is as easy as plugging-in your phone.

The advantages of Local Area Networks (LANs) are well known. Existing personal computers can be tied together to share information and expensive peripherals such as disks and printers.

Now AST makes networking easier and more economical than ever before. With AST-

PCnet II, you simply insert the PCnet II board into an I/O slot in your IBM PC or XT. Then connect the PCnet II "twisted-pair" cable to the main network cable using a standard modular "telephone jack."

The same kind of jack that's used on your telephone. To move your PC from one point to another on the network, simply plug in at the desired location. It's that easy.

With AST-PCnet II, anywhere from 2 to 160 PCs can be interconnected. Standard PC-DOS commands are used to access remote drives and printers. And dedicated file and print servers are not required, because shared PCs also function as standard workstations.

We're AST, the world's leader in communications and enhancement products for the IBM PC. To find out how AST-PCnet II can expand your IBM PCs and

XTs into a reliable, versatile LAN, call or write AST Research, 2121 Alton Avenue, Irvine, California 92714.

(714) 863-1333. TWX: 753699ASTR UR

AST-PCnet II is a development of AST Research Inc. Software protocols are based on technology licensed from Orchid Technology Inc.

AST

RESEARCH INC.



AST-PCnet II Local Area Network

CIRCLE 104 ON READER SERVICE CARD

TWO MODEMS

is accomplished within the PBX and does not require a separate modem.

PBX systems available from such companies as AT&T Information Systems, Intecom, Rolm, and NEC provide combined voice and data telephone service for an average of \$600 to \$1,000 per station. The integration of voice and data will soon include the capability to append verbal comments to digital messages such as text

It is fairly easy to predict the coming demise of modems as separately marketed devices.

or graphs. Systems like this are now being designed by companies such as Wang and IBM. (Interestingly, Wang recently completed a business agreement with Intecom, a major digital PBX manufacturer, and IBM has purchased a large portion of Rolm, another major PBX company.) Digital PBX systems offer many capabilities for companies of almost any size, and they will provide significant competition for the local area network systems using cables that are already being marketed by several companies. The capabilities contained within the digital PBX will quickly reduce the need for separate modem devices in corporate offices.

Nevertheless, at this time and with the equipment now on the market, a 1200-baud modem is a good investment if you need data communications capability. The capability of both the POPCOM X100 and the PC-IntelliModem to smoothly switch between voice and data transmissions is a modern modem feature that is valuable in many situations. And until modems become a part of the computers we buy for personal use and a part of the telephone systems installed in our offices, these two modems will continue to embody the state of the art in microcomputer communication products.



(Formerly Warehouse Software)

Call for programs not listed.

Technical & Other Information (602) 246-2222
TOLL-FREE ORDER LINE 1-(800) 421-3135

WE ♥ YOU!

For making us one of the fastest growing microcomputer product suppliers in the country. In appreciation, for the next few weeks we are offering a program diskette for the IBM PC with 57 utility programs at no charge to anyone who makes a purchase of at least \$125. These programs have been nationally reviewed, and recently updated and are of the highest quality. Included are programs to print labels, balance your checkbook, select printer type fonts, maintain an auto expense log, plus 53 others. We hope that you will like these programs so much that maybe you will ♥ us too.

DATA BASE MANAGEMENT SYSTEMS

Dbase II and Dbase III	Call
Fox and Geller Quickcode	\$159
KnowledgeMan	\$275
Condor III	\$330
NWA Stepak	\$260
Tim IV	\$249
Infostar	\$296
PFS File	\$95
FRIDAY	\$175
Personal Pearl	\$145
Fast Facts for IBM PC	\$135
Rbase 4000	\$285

WORD PROCESSING

Wordstar, Mail Merge, Correct	
Star, Star Index	\$345
Wordstar	\$235
Mail Merge or Correct Star	\$130
Microsoft Word With Mouse	\$295
Word Perfect	\$295
VolksWriter for the IBM PC	\$110
VolksWriter DeLuxe	\$175
Aspen Spellchecker	\$36
MetaSoft Benchmark	\$285
Multimate	\$275
Peachtree 5000	\$195

SPREADSHEETS

Calculus	\$59
Supercalc II	\$59
Supercalc III	\$199
Microsoft Multiplan	\$130
ITK Solver	\$285

ACCOUNTING

TCS equivalent of Peachtree - Specially augmented by Warehouse Software. Customized for your IBM PC Terminal and Printer - GL, AR, PA, AP, CP/M-80, CP/M-86 for XT/XT, DOS 1.1, 2.0.	
Each Module	\$75 For All Four \$275

CYMA

Dollars & Sense	Call
MESI, Real World, GL, PA, AP, AR	\$5
Each Module	\$250

TRANSFER PROGRAMS

Move-It	\$85
Microstuff Crosstalk	\$105

BEST PRICE IN U.S. FOR IBM PC OR CLONES	
Multifunction Board - Includes Async Adapter, Parallel Adapter, Clock with battery back-up	
Software, 64K memory expandable to 512K, 1 year warranty	\$249

LANGUAGES

Lifeboat Lattice C Compiler	\$295
Microsoft C Compiler	\$315
Microsoft Pascal Compiler	\$215
Microsoft Basic Compiler	\$245
Microsoft Basic Language	\$235
CBASIC 85 for IBM PC	\$135

FOR PC DOS

Norton Utilities	\$55
Copy II PC	\$34
Prokey V3.D	\$89
Harvard Project Manager	\$285
Microsoft Flight Simulator	\$495

HARDWARE

Hayes 1200 Modem	\$385
Hayes 1200B Modem for IBM PC	\$425
Internal Modem for IBM PC	\$285
Anchor Signalman 1200baud Modem	\$285
MPI 360K Disk Drives	\$185
CDI 360K Disk Drives	\$215
1/2 Height Panasonic Drives D/S D/D	\$185
10 MB internal hard drive for IBM PC	\$995
10MB external hard drive for IBM PC	\$1095
Princeton RGB monitor	\$470

COMPUTERS

Corona or Zenith Computer	Call
Portable or Desk Top	Call

BOARDS FOR THE IBM PC OR LOOKALIKES

Quadram Color I	\$199
Quadram Color II	\$245
256K Sigma Ram Board	\$299
Maynard Sandstar Controller	\$195
STB Graphics Boards	\$285
Sigma Disk Controller	\$185

PRINTERS

Bluechip M120/D	\$249
Gemini 15X	\$299
Gemini 15X	\$309
Dixidata 82A	Call
Dixidata 83A	Call
Dixidata 84P	\$949
Dixidata 82P	\$425
Dixidata 83P	\$639
Juki 6100	\$420
Call on all Epson Models	

Daisywriter 2000	\$1000
Silver-Read	Call
Diablo 620	Call
Diablo 630	Call
NEC 3550	Call
TERMS: Prices include 3% cash discount. Add 3% for charge orders. Shipping on most items \$5.00. AZ orders +6% Sales Tax. Prices subject to change.	

TOLL-FREE ORDER LINE 1-(800)-421-3135

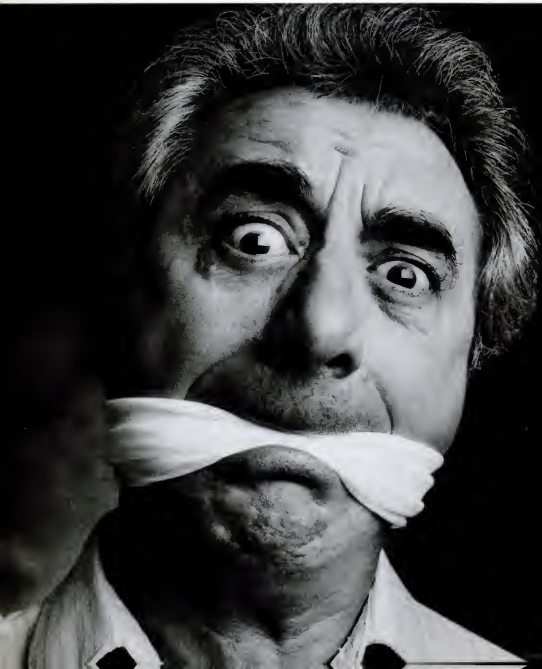
WAREHOUSE DATA PRODUCTS

2701 West Glendale Ave., Suite 6

Phoenix, AZ 85021



**To communicate voice
the ordinary modem**



and data simultaneously, leaves a lot to be desired.

Introducing the Tel-A-Modem.

Now you and your personal computer can talk on the same phone at the same time.

Let's say, for example, certain data you were transmitting via your personal computer to a remote computer user needed some verbal explanation to go along with it. With the ordinary modem it couldn't be done. Not simultaneously.

You'd have to first call the user to inform them that data was coming. Hang up. Redial in order to connect modems. Transmit the data. Hang up. And then call back with your explanation. If you had additional input to transmit and discuss, you'd have to begin the whole process again. Talk about frustration.

Code-A-Phone's solution to this problem is the Tel-A-Modem. An innovative two-line desk telephone integrated with an intelligent modem capable of transmitting voice and data simultaneously.

Of course, the genius of Tel-A-Modem doesn't end with its unique communication capabilities and state-of-the-art convenience.

Specially designed for use with RS-232C compatible computers and terminals, it offers a full spectrum of both telephone and modem cost effective features, including: single button selector for voice or data on either line; full-duplex mode; automatic answer/origi-

nate modes; 300 and 1200 baud data transmission rates; automatic selection of baud rates; switch dialing for tone-dial or pulse-dial systems; memory autodial; and modem status LEDs.

So much for words.

For more information and the name of your nearest Tel-A-Modem dealer, call 1-800-547-4683. That is, just as soon as your computer gets off the phone.

In Oregon, Alaska and Hawaii, call 1-503-655-8940.

Code-A-Phone®
A SUBSIDIARY OF CONRAC CORPORATION



COMPUTER HUT™

COMPARE
OUR
SERVICE & PRICE!

SPECIAL OF THE MONTH

IBM-PC & XT
& PORTABLE
CALL FOR
PRICE



DISK DRIVES

Tandon TM100-2 DS/DD	\$199
MATSUSHITA JA 551	179
TEAC FD-55B Slimline	189
SHUGART SA-455 half-high	
AMDEK half-high	BEST
HITACHI half-high	PRICES

ME MAYNARD ELECTRONICS

Floppy Disk Controller	\$169
FDC w/Par. Port	\$219
FDC w/Ser Port	\$239
SANDSTAR SERIES	CALL
QUADRAM	
Quadboard-PP, SP, C/C, Mem + s/w	
Expandable to 384K	CALL
Quad 512 + SP, Mem w/64K	\$249
Quadcolor	CALL

AST RESEARCH

MegaPlus II 4-Funct 64K + s/w	\$279
6-Pack 5-Funct 64K + s/w	\$279
I/O Plus	\$129
STB	CALL
MICROLOG	
Baby Blue	\$359
Baby Blue II 64K	\$539

GRAPHICS BOARDS

TECMAR	
Graphics 720 x 400 16 colors	\$509
HERCULES	
Hi Res Mono Graphics 720 x 348 \$349	
Color Graphics w/Par Port	CALL
PCI PRODUCTS	
COLORPLUS 640 x 200,	
16-Color w/Par Port + s/w	\$389
MA SYSTEMS	
PC Peacock w/Par Port	\$249
PARADISE	
Multidisplay	\$395
AST	
MonoGraphPlus	CALL

HARD DISK - IBM-PC & XT

MOUNTAIN — External Syst.	
10MB	\$1799 20MB \$2549
27M Tape back up	\$1649
MAYNARD WS1/WS2/WS3	CALL
TALLGRASS	CALL

PRINTERS

EPSON	
FX80	CALL FX100 CALL
brother	
HR-15 Par	\$419 Ser \$439
HR-25	\$699 HR-35 CALL

DYNAX	
DX-15 Par	\$419 Ser \$439

C-TOH	
STARWRITER A-10	CALL
STARWRITER F-10 P	\$1095

SONIC MICRONICS	
Gemini 10X	\$289 15X \$399

OKIDATA

84P	CALL	84S	CALL
92P	BEST	92S	BEST
93P	PRICES	93S	PRICES

NEC

3510	\$1375	7710	\$1895
3530	\$1375	7720	\$2495
3550	\$1695	7730	\$1895
2050	\$895	2030	\$749

TOSHIBA	
P1351	\$1575
P1340	\$839

DAISYWRITER	
2000 w/48K Buffer	\$995
IDS	CALL



MODEMS

Hayes	
Smartmodem 1200	\$489
Smartmodem 1200B	\$419
NOVATION, ANCHOR	CALL

COMPUTERS

COLUMBIA	
DATA PRODUCTS INC	CALL
TAVA PC	CALL
COMPAQ	CALL

MONITORS

AMDEK	
Video 300G	\$145 300A \$155
Video 310A	\$179
PGS	
HX12 Hi Res RGB monitor	BEST
MAX-12 Hi Res Mono	PRICES
SR-12 Super Hi Res RGB	



SOFTWARE FOR IBM-PC

LOTUS	CALL
Word Perfect \$279	WordStar \$275
DBase III	CALL VisiCalc \$189
Multiplan	\$175 Multimate \$299
MICROSOFT Word	\$269
FRAMEWORK	CALL

AND LOTS MORE

CANADIAN COMPUTER HUT

AUTHORIZED DEALER

MICROCONTEXT INC.

5253 AVE DU PARC
MONTREAL
QUE H2V4P2.

(514) 279-7291

Published Prices are for U.S.A. Only
Please call for Canadian Prices

ANY PRODUCT NOT LISTED? CALL

COMPUTER HUT
OF NEW ENGLAND INC.
101 Elm St., Nashua, NH 03060

ORDERS & INFORMATION
(603) 889-0666

ORDER-LINE ONLY
PLEASE
(800) 525-5012

All products usually in stock for immediate shipment and carry full manufacturers' warranty. Price subject to change — this ad prepared two months in advance. You may find lower prices elsewhere. *Call us up for \$500 and \$1000 orders. *No shipping or handling charge. *No sales tax. *We accept company checks and P.O.'s from Fortune 1000 Companies.

IBM is a trademark of IBM Corp

Return authorization and order status (603) 889-7625

Using MS FORTRAN On the PC

An excellent piece of software at an outstanding value, Microsoft's FORTRAN compiler provides all the tools needed to convert most mainframe FORTRAN programs to the PC.

FORTRAN, which stands for FORmula TRANslation, is one of the original high-level languages developed for programming mainframe computers. Its primary users have been scientists, engineers, statisticians, and other technical people, and the vast majority of all scientific and engineering software available for mainframe computers has been written in FORTRAN. Now, Microsoft has released a new version of its FORTRAN compiler for the IBM PC. The new release, Version 3.20, is an update of Version 3.13 and adds several major enhancements. With the advent of this high-quality compiler for the PC, many "mainframe-only" FORTRAN programs may become available to PC users.

In fact, much of the interest in Microsoft's FORTRAN will come from people interested in translating programs previously used on mainframes into versions compatible with the PC. This will not only save engineering, architecture, and scientific firms millions of dollars a year in



Illustration: Mark Penick

mainframe time-sharing costs but will undoubtedly contribute to greater use of sophisticated analysis packages by small firms that either cannot afford mainframe time, or that simply have never used a mainframe service.

The key question is how much code will have to be changed in the process of translating mainframe FORTRAN to PC FORTRAN. It turns out that Microsoft FORTRAN Version 3.20 is a superset of the ANSI X3.9-1978 subset of standard FORTRAN, which means that many mainframe programs will require comparatively little modification to run on the PC. However, difficulties will remain in character handling, the PRINT statement, and free formatting of input.

FORTRAN's Advantages

In addition to translating mainframe programs, FORTRAN can also be used to write original programs. This has several advantages:

- Programs written using the Microsoft version of FORTRAN will run almost without modification on many mini and mainframe computers. This makes FORTRAN's code much more transportable than, for example, BASIC.
- Microsoft FORTRAN produces extremely fast floating-point arithmetic code, the kind most often used in scientific and engineering applications. In addition, Microsoft FORTRAN supports the 8087

FORTRAN programs can easily be written as a series of relatively small subroutines.

coprocessor, which allows real arithmetic to execute as much as 30 times faster than on the PC's standard 8088 chip. This feature is a major selling point for engineering programs that are limited in speed primarily by arithmetic calculations.

- Microsoft FORTRAN allows use of the entire installed memory in the PC. This allows the user to run large programs that include extremely large data blocks. Data can utilize any portion of PC memory not taken up by resident DOS or the program code itself.

- The size of executable code produced by Microsoft FORTRAN is relatively small, which allows large programs to run on PCs with limited memory.

- Many scientific and engineering firms are already familiar with FORTRAN programs and will feel more comfortable with a program written in FORTRAN than in Pascal, for example.

- FORTRAN programs can easily be written as a series of relatively small subroutines. The FORTRAN programmer can thus build up a library of subroutines for use in different programs. In addition, debugging is far easier on small subroutines than on large programs.

- Perhaps most importantly, a tremendous amount of debugged FORTRAN code is available for utilization as subroutines in scientific and engineering programs. FORTRAN programmers can use these existing subroutines to build large, complex programs.

FORTRAN's Disadvantages

Unfortunately, the nature of the language also imposes limitations on programming in FORTRAN. The following

features, taken for granted by BASIC programmers, are not supported by Microsoft FORTRAN:

- Direct cursor control on the screen is not allowed, although it is possible to control the cursor using DOS 2.0 commands executed from within a FORTRAN program.
- FORTRAN has no graphics commands.
- FORTRAN makes no provision for joysticks, light pens, mice, or voice activation.
- Serial ports are difficult to fully control. It is possible to read and write data to or from a serial port, but complete control is lacking.
- Keyboard input cannot be trapped during program execution.
- Random number generation is not supported.
- FORTRAN does not provide a direct way to place binary values in specific storage locations. Microsoft's version has no equivalent to BASIC's PEEK and POKE commands.
- Unlike BASIC, FORTRAN has no built-in editor.
- There is no interpreter available. This means that all FORTRAN programs must be written, compiled, and linked before they can be run, unless you use the DOS utility DEBUG to execute object code.
- No interactive debugger is available. To debug a FORTRAN program, you usually have to insert extra WRITE statements to find the values of variables as the program progresses.

One way to overcome these limitations is to write your own assembly language subroutines to perform any needed tasks. Alternatively, you could use the linker that Microsoft supplies with the package to link FORTRAN programs with existing Pascal or assembly language programs. Unfortunately, writing assembly language routines to interface with FORTRAN is a major undertaking and is not likely to interest programmers who want to quickly produce operable programs. Using the linker is no simple task either, since the



Microsoft FORTRAN Compiler, Version 3.20

Microsoft Corporation
10700 Northup Way
Bellevue, WA 98004
(800) 426-9400
(206) 828-8080
List Price: \$350

Requirements: 140K user space in RAM, one disk drive (196K user space in RAM, two disk drives). 8087 math coprocessor optional.

CIRCLE 794 ON READER SERVICE CARD

When you compare the E-Series 3140 with the available HX-12 side-by-side, your eyes will see the difference.

The HX-12 gives you higher resolution and finer dot pitch (.31mm) than the IBM 5153's medium resolution (.43mm) for a cleaner, sharper image.

Compare our full range of colors and our crisp whites without red bleed. You'll also see a difference in

cable that plugs directly into your PC, ready to burst forth with the superb colors. All at a suggested price (\$695) that's a pleasure for some eyes and overworked budgets.

Princeton
Graphic
Systems

1101-1 State Road Princeton New Jersey 08540
609-683-1660 TLX:6857009 PGS Prin.
800-221-1490

DON'T COMPROMISE:



OURS: .31 mm dot pitch, 80 column text.



THIERS: 43 mm dot pitch, 80 column text.

THE PRINCETON HX-12

for the image
your eyes deserve

CIRCLE 299 ON READER SERVICE CARD



MS FORTRAN

file-control block in FORTRAN is different from the one used in Microsoft Pascal, and FORTRAN's internal representation of numbers may also be different from that of other languages. Linking a FORTRAN program with a BASIC program is not even mentioned in the manual. While it may be possible, it is likely to be extremely difficult.

In addition, competing languages such as Pascal and C have libraries of machine language subroutines available to perform such activities as cursor control, graphics generation, and communications port control. Until assembly language tools become available for FORTRAN, you should select a different language for systems programs, graphics routines, and communications programs. As things stand, FORTRAN is best suited for scientific and engineering programs.

Microsoft versus "Standard"

Microsoft describes Version 3.20 of FORTRAN as a superset of the full standard ANSI FORTRAN. Much of the full ANSI FORTRAN standard language, and a few features beyond the standard, are supported. Of course, there are many versions of FORTRAN available on mainframes, some of which include features not available in either ANSI or Microsoft FORTRAN. Many commonly used commands are either not supported by Microsoft or are implemented differently on other machines.

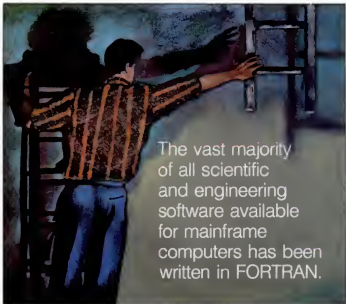
Many FORTRAN compilers support free-format input on READ statements. Many different versions of free format exist; a common one is

```
READ(5, -) A,B,C,D
```

with no associated FORMAT statement. The main advantage of free format is that the user need not line up columns for data entry. The Microsoft implementation of free format uses statements such as:

```
READ(5, *) A,B,C,I
```

In this case, if A,B,C, and I are not explicitly typed, the program will expect three



The vast majority of all scientific and engineering software available for mainframe computers has been written in FORTRAN.

real numbers followed by an integer. If the input were 1,2,3,4, for example, the 1,2, and 3 would be converted to reals of the form 1.0 while the variable I would be assigned the value 4. Inputting a real as the fourth value will produce an error, since integers can be converted to reals on input, but not vice versa. If it is necessary to read a double-precision, logical, or character variable, the variables should be declared with a TYPE statement before the READ occurs.

The PRINT statement is supported by many FORTRAN compilers, but not Microsoft's. The PRINT statement is designed to allow easy output where exact formatting is not critical. A typical PRINT statement syntax might be:

```
PRINT 10,A,B,C,D
```

The simplest way to get around the problem is to use a word processor to replace all PRINT statements with the statement

```
WRITE(NW, )
```

where NW is the unit that you wish to

write to. Later, the blanks are filled in with the number of the FORMAT statement you use.

Microsoft FORTRAN supports direct sending of data through either a serial or parallel port, although the documentation is not very clear on this point. The best way to send data to a printer is to use an OPEN statement of the form:

```
OPEN(6, FILE='LPT1:', STATUS  
= 'NEW')
```

Any data subsequently sent to unit 6 will then be printed on printer LPT1:. Similarly, to send data to communications port 1, simply open a 'COM1:' file if you have a printer attached to a serial port.

Alternatives include using Ctrl-PrtSc to toggle the printer on before running the program, or inserting PAUSE statements in the program at strategic points. The user could then be prompted to press PrtSc to print the screen visible at that time.

It is also possible to direct output to a file for later viewing. Microsoft FORTRAN supports sequential, random, and

MS FORTRAN

binary files, so the programmer has tremendous latitude in file manipulation. Directing output to a file is probably the best approach to presenting a small amount of data on the screen while saving full data output for later printing using DOS' TYPE command.

One nice feature of Microsoft FORTRAN is its support of character variables. A character variable is simply a string of characters enclosed by single quotation marks, for example 'ABCD'. These variables can be used in dimensioned arrays and also in relational expressions such as

```
IF (A .EQ. 'XYZ') GO TO 10.
```

In order to declare a character variable, you use a type declaration statement of the form:

```
CHARACTER INPUT*64,A*2
```

In this case, INPUT becomes a 64-character variable, while A becomes a 2-character variable.

Many older, mainframe FORTRAN compilers do not allow for character variables. You must use a formatted WRITE statement to print an error message on one of these machines. If the programmer wants to emulate character variables, he might declare a given variable as real or double precision, then assign a string to the variable using a DATA statement. For example, some compilers accept the following:

```
REAL X(6)
DATA X/'THIS','IS
      A','SHOR','T ME',
      'SSAG','E '/
WRITE(6,100) (X,I = 1,6)
100 FORMAT(6A4)
```

This type of tortured syntax may be replaced with the much cleaner code:

```
CHARACTER X*21
DATA X/' THIS IS A SHORT
      MESSAGE'/
WRITE(6,100) X
100 FORMAT(A21)
```

or the even simpler code:

```
WRITE(6,'(A)') ' THIS IS A
      SHORT MESSAGE'
```

Microsoft FORTRAN's ability to handle character variables is so much better than that of most of the older mainframe FORTRANs I have worked with that I usually rewrite the character-handling code completely.

A hard disk is an excellent idea for serious FORTRAN programmers.

Version 3.20 implements complex variables of the form $A + Bi$, where A and B may be integer, real, or double-precision variables. In addition, the standard FORTRAN arithmetic operations for complex variables are supported, including addition, subtraction, complement, and so on. Previous versions of Microsoft FORTRAN did not allow for complex variables, so electrical engineers should be happy with this one. Also, BLOCK DATA subprograms are supported in Version 3.20, which will make mainframe program conversions easier than they were in previous versions.

As you can see, the main problems Microsoft FORTRAN presents are likely to be connected with DATA, PRINT, CHARACTER, and free-formatting statements. None of these problems is particularly difficult to handle. Simply make sure that variables assigned values with a DATA statement are not mentioned in COMMON blocks and check that the character variables that you define to replace other types of variables are not accidentally left dimensioned.

Word Processors

Writing or altering FORTRAN programs is best done on a word processor, but a word processor good for letter writ-

ing may not be suitable for programming. I use *Proofwriter* because it provides the programming features I need. For example, it easily edits files of indefinite length. This is extremely important for modifying mainframe programs, many of which are thousands of lines long. The easiest approach is to download the entire program from the mainframe onto the PC via a modem, then break the file into subroutines for easy editing and compiling. I normally search the program for END statements and open a new file for each sub-routine.

Fast search and replace capability is also important for a word processor used in programming. With a 5,000-line program containing many PRINT statements, for example, a global replace statement is virtually a necessity. Your word processor must also be capable of inserting control characters directly into the text. This is necessary to directly control cursor movements by sending escape character sequences to the screen with WRITE statements.

A word processor used for FORTRAN programming should be capable of converting tabs to spaces. Most FORTRAN statements start in Column 7. The easiest way to enter these lines is to tab over to Column 7. Microsoft FORTRAN correctly identifies a tab in Columns 1 through 5 as a signal to start reading program code in Column 7, but not all FORTRAN compilers are as forgiving. If you plan to transport the code, the safest approach is to convert each tab into six blanks at the start of each line.

Finally, a word processor that allows multiple indented paragraphs will be very useful for writing structured programs.

Hardware Requirements

Theoretically, Microsoft FORTRAN requires a minimum of one single-sided disk drive and 150K RAM (after the operating system is loaded). In practice, the compiler will be extremely awkward to use with only one disk drive. I recommend two double-sided disk drives and at least

MS FORTRAN

256K RAM. A hard disk is an excellent idea for serious FORTRAN programmers.

It is also possible to compile and link programs using a RAMdisk. The main difficulty with this approach is the size of the compiler program and the problem of linking several large (or many small) object modules together. To compile a FORTRAN source program, you need to make two passes, using a different program each time. The first pass loads FOR1.EXE (119,890 bytes). The second pass loads PAS2.EXE (97,152 bytes). The simplest approach to using a RAMdisk is to copy the program you wish to compile onto the RAMdisk and place the floppy containing FOR1.EXE and PAS2.EXE into the A: drive. Log onto the RAMdisk and type A:FOR1 followed by A:PAS2. The program object code will then be created on

the RAMdisk, and you can go on to compile each subroutine in turn.

Linking may be more of a problem. The linker requires 39,680 bytes in DOS

Curiously, Microsoft does not mention the use of a hard disk or RAMdisk in its manual.

1.1. In addition, the standard linking library, FORTRAN.LIB, of 85,504 bytes must be available. The default math library requires an additional 35,328 bytes (the 8087 math library requires only an additional 18,432 bytes). It is possible to

load both the linker and library onto a RAMdisk, but there wouldn't be much room left for the object modules.

During the linking process, the required memory may exceed the sum of the object modules plus the library. If this occurs, the linker sets up a file called VM.TEMP. If your RAMdisk is too small to hold all the object programs and VM.TEMP, the process aborts. You could copy the object programs onto the RAMdisk and leave the linker and library on the A: drive, but this would sacrifice much of the RAMdisk's speed advantage.

One other problem arises if you don't have a hard disk. FORTRAN programs are particular about syntax and are often full of errors when first created. The compiler will flag most of these, and you will then have to edit the source file. On floppy

POWER-BASE™ PUTS YOU W

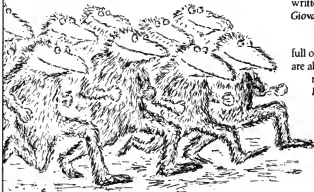
"Power-base" is a menu-driven data management program with relational capabilities. It was the top-rated program overall, primarily because it was the easiest to learn and use, and rated highest in error handling." *The Ratings Book/Software Digest*, March 1984

"To track the Bank of New England's IRA sales for all 16 branches, I chose Power-base" because it responds so well to change while protecting the integrity of my database." *Bruce Montgomery, Bank of New England*

"This program is impressive—it's easy to use, simple, logical, and powerful and comes with flawless written documentation." *Giovanni Perrone, InfoWorld*, March 12, 1984

"Because you don't have to wade through screens full of menus, the program is fast. Because your choices are always in front of you, the program is easy. Not much more you can ask for, is there?"

Bobbi Bullard, Computer Retailing, April 1984



MS FORTRAN

pies, this means reloading your editor, retrieving your file, making the changes, writing the new file to disk, and restarting the compiler again. You'll soon learn the meaning of the "floppy shuffle." A hard disk reduces the aggravation to a more tolerable level.

Curiously, Microsoft does not mention the use of a hard disk or RAMdisk in its manual. Presumably, Microsoft believes that anyone who has these devices will be able to install the compiler without instructions. Although the process is quite straightforward, the following suggestions may make it even easier:

- Copy all of the supplied programs onto a separate directory in the hard disk. I call my directory /COMPILER/FORTRAN. This step is easy since the programs are not copy protected.
- Decide which FORTRAN library to

use. If you don't have an 8087 chip, use MATH.LIB and FORTRAN.LIB. If you do have an 8087 chip, read the directions in the manual carefully before selecting a library.

- Decide which linker to use. Use LINK.V2 with DOS 2.0, but use LINK.EXE, the default linker, for DOS 1.1 applications.
- Set up a new directory to compile and link applications programs (I call my directory /FORTRAN/PROG). Copy the selected linker and library into this directory, and name them LINK.EXE and FORTRAN.LIB, respectively.
- Set up an AUTOEXEC.BAT file to automatically define the PATH at startup. Make sure the PATH includes your compiler directory, FORTRAN program development directory, and word processor directory.

Editing, Compiling, and Linking

You are now ready to edit, compile, and link FORTRAN programs. The simplest approach is to break each program into a main routine and a series of subroutines that will be edited and compiled separately. Once each routine is fully debugged, you can link them together into a workable program. Working on small subroutines is much easier than trying to compile a large program all at once, and there is no difference in final code size.

Initially, you should compile each subroutine using the \$DEBUG metacomp command (see Chapter 6 of the Microsoft manual). With \$DEBUG on, arithmetic errors such as divide by 0 are flagged, and the line in the source code where the error occurred is displayed at runtime. If \$DEBUG is off, the generated code is about 40 percent smaller, but if the program crashes

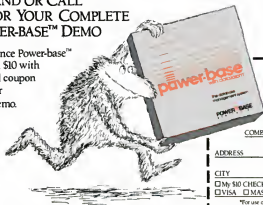
WAY AHEAD OF EVERYONE.

"Much to my surprise, my search for a data-base system took six months. But at last I've come up with a winner: Power-base."

Paul Bonner, *Personal Computing*, February, 1984

SEND OR CALL TODAY FOR YOUR COMPLETE POWER-BASE™ DEMO

Experience Power-base™ yourself. Send \$10 with the completed coupon below for your Power-base demo.



Or call 1-800-237-4778 (In NY, 212-947-3590). Use the demo to set up actual applications (restricted to 25 records) on your personal computer.* See how simple it is to learn and use Power-base. We'll refund the \$10 when you purchase Power-base at any computer dealer.

WE MADE IT POWERFUL. BUT WE KEPT IT SIMPLE.

☐ Send me my demo copy of Power-base.™

Mail to: PowerBase Systems, Inc. Dept. A-1
12 West 37th Street, NY, NY 10018

NAME TITLE

COMPANY NAME

ADDRESS

CITY STATE ZIP

☐ My \$10 CHECK IS ENCLOSED

☐ VISA ☐ MASTERCARD #

EXP DATE

*For use on the IBM PC and PC XT or compatibles. Power-base and DataZOOM are trademarks of PowerBase Systems, Inc. IBM PC and IBM PC XT are registered trademarks of the IBM Corporation.

CIRCLE 160 ON READER SERVICE CARD

MS FORTRAN

during execution, it does not indicate the associated line number, which makes it extremely difficult to figure out what went wrong. Once you are certain that the program works correctly, recompile and link all routines using \$NODEBUG to produce smaller, faster code. If an error occurs later, you can rerun the same data using the \$DEB version to localize the problem.

One serious complication may develop. If you have any DIMENSION or COMMON statements in your program, space will be set aside at runtime for any named variables. When you run the program, values will be associated with these variables and stored in specific addresses within the computer. Termination of the program does not erase these values. When you rerun the program later, the variables so created will retain their original values unless you reset the computer in the interim.

This can lead to some very subtle difficulties. Suppose you run a program that assigns the value 10.0 to A, and A is mentioned in a COMMON block. If you rerun the program and reassign a value to A, you won't have any problem. However, if you use a different input file, and A is not reassigned, you will be left with the old value of A still in memory. Any program statements that refer to A will execute using the old value. This can produce erroneous calculations or printouts.

FORTAN possesses no CLEAR statement. You must reinitialize each COMMON block and DIMENSIONED array that will not be overwritten either at the beginning or end of each program, or reset the computer using Ctrl-Alt-Del after running the program. Failure to do so can lead to errors that are extremely difficult to detect.

Compilation and Linking

The speed of compilation and linking depends on the type of system you are using. As a benchmark, I compiled a bridge-girder design program containing a main program of 38 lines and a single subroutine of 384 lines using three different

system setups. The results can be seen in Figure 1.

A RAMdisk is clearly the fastest way to compile and link, although a hard disk is considerably easier to use. If no hard disk is available, creating a RAMdisk can practically double the speed of compilation and linking.

One of Microsoft FORTRAN's main advantages is its ability to use the 8087 chip for fast execution. Because this is so important, Microsoft provides several different ways to compile and link a program, each of which produces differently sized programs that run at various speeds.

Version 3.20 of the documentation carefully outlines the various options, although it is a bit difficult to understand exactly what is happening.

To understand the options, first look at the libraries supplied with the compiler, MATH.LIB, 8087.LIB, and ALT-MATH.LIB. You specify which of these libraries the linker will use by naming the one you want to use MATH.LIB.

If you have an 8087 chip installed, the 8087.LIB library will produce the smallest, fastest code possible, but programs linked with this library will run only on machines equipped with the 8087 chip. If

	Hard disk	Floppy disk	RAMdisk
Load F061	5 sec	11 sec	3 sec
See page 1	45 sec	55 sec	38 sec
Load PAS2	8 sec	12 sec	3 sec
See page 2	132 sec	188 sec	105 sec
Load LINK	3 sec	5 sec	2 sec
Run linker	63 sec	111 sec	57 sec
Total	254 sec	394 sec	205 sec

Figure 1: A table showing execution times for various FORTRAN subroutines using three different data storage media: hard disk, floppy disk, and RAM disk. The routines were run on a sample program containing a main program of 38 lines with a subroutine of 384 lines. (Note: These results used Microsoft FORTRAN Version 3.13, but results with Version 3.20 should be nearly identical.)

Compiled with \$NOFLOATCALLS	= 38,999 bytes object code, time = 4:45
Linked with 8087.LIB	= 56,154 bytes executable, time = 1:15
Linked with MATH.LIB	= 68,650 bytes executable, time = 1:09
Compiled with \$FLOATCALLS	= 41,975 bytes object code, time = 5:15
Linked with 8087.LIB	= 55,194 bytes executable, time = 1:13
Linked with MATH.LIB	= 73,706 bytes executable, time = 1:19

Figure 2: A table showing the size of code generated and the time required for same possible compilation and linking combinations, using the sample program from Figure 1. All compilation and linking was done on a hard disk.

MS FORTRAN

you don't have an 8087 chip, you must use either the original MATH.LIB library or the ALTMATH.LIB library. A program linked with MATH.LIB will use an 8087 chip on machines equipped with one, although the program will run slower than one linked with 8087.LIB.

If you don't have an 8087 chip, you can obtain some speed increase by using ALTMATH.LIB. The math routines in this library are optimized for speed on machines lacking the 8087 coprocessor, but the results are not as accurate as those obtained using either of the other two math libraries. In addition, running a program

linked with ALTMATH.LIB on an 8087 equipped machine is pointless, since the 8087 chip is ignored.

During compilation, you have the option of using the \$FLOATCALLS metaccommand in any subroutine (the default is \$NOFLOATCALLS). With \$NOFLOATCALLS, the program interrupts the 8088 chip for each floating-point operation performed by the 8087 chip. If you link with the MATH.LIB library, this means that the 8087 chip is entirely interrupt driven. This saves code space but is not as fast as generating specific subroutine calls to the 8087 as part of the pro-

gram. In order to generate subroutine calls to the 8087, you must use the \$FLOATCALLS metaccommand. This generates additional code, but the arithmetic is done faster, so the overall effect is a faster program.

If you use \$FLOATCALLS with the MATH.LIB library, you will generate subroutines that emulate 8087 arithmetic using the 8088 chip. Since the 8088 chip handles only 16 bits at a time, versus 80 bits for the 8087, doing arithmetic with the 8088 will be slower than with the 8087. As a result of chip design and other factors, the 8087 chip is about 30 times faster than the 8088 chip for double-precision arithmetic.

Figure 2 shows the size of code generated and the time required for each different compilation and linking option. The source code is a 617-line, 25,000-byte continuous-beam-design program with a moderate amount of floating-point arithmetic.

Further insight about the performance of the 8087 chip can be obtained by studying the timed results for the execution of different phases of HOBCEW.EXE, a 2,500-line hydraulic-analysis program with considerable floating-point arithmetic in Figure 3. The program was compiled using the standard MATH.LIB library with \$NOFLOATCALLS.

We can see that the 8087 chip has no effect on disk-read speed or screen-writing speed. It did improve computation speed 12 times, which is a fairly typical result for engineering programs. If the program had been compiled using \$FLOATCALLS, there would have been perhaps a 10 to 20 percent improvement in computation speed, but the load time for the program would have increased because of the additional code.

These tables lead to the conclusion that if you will be running the program exclusively on 8087 equipped PCs, the best way to compile is with the 8087.LIB library. If you want maximum speed at the expense of additional code, use the \$FLOATCALLS option. If you don't have the 8087

	PC With 8087	PC Without 8087
Read data off floppy	4 sec	4 sec
Compute results	3 sec	36 sec
Write answers to screen	13 sec	13 sec
Total time	20 sec	53 sec

Figure 3: A table comparing the execution times for various phases of a sample program between a standard PC and one equipped with an 8087 math coprocessor.

```
CHARACTER X*23
X = ' TEST OF PROGRAM OUTPUT'
WRITE(*,10) X
10 FORMAT(A23)

WRITE(*,'(A23)') X

WRITE(*,*) ' TEST OF PROGRAM OUTPUT'

WRITE(*,20)
20 FORMAT(' TEST OF PROGRAM OUTPUT')

WRITE(*,('' TEST OF PROGRAM OUTPUT''))

WRITE(*,'(23H TEST OF PROGRAM OUTPUT)')

WRITE(*,30)
30 FORMAT(23H TEST OF PROGRAM OUTPUT)
```

Figure 4: A selection of code blocks that will write the message "TEST OF PROGRAM OUTPUT" to the screen, followed by a line feed.

MS FORTRAN

chip, or want your program to run on PCs with or without the chip, link with the standard MATH.LIB library. Again, for maximum speed at the expense of additional code, use the \$FLOATCALLS metaccommand.

Screen Writing

A very common computer operation is writing data to the screen or a file. Since this operation is so important, it's worthwhile to examine FORTRAN's options and speed in detail. There are many different ways to print data or messages on the screen. For example, the blocks of code in Figure 4 will all print the message "TEST OF PROGRAM OUTPUT" to the screen, followed by a line feed.

It turns out that each of these program blocks writes to the screen at exactly the same speed, presumably because they are all compiled and linked into the same machine language instructions. Interestingly, the screen-write speed in FORTRAN is slower than in interpreted BASIC. The screen-write speed varies depending on whether you have the color/graphics card or a monochrome card installed, and on whether you are using a PC or a Compaq computer. Figure 5 compares the times, at different configurations, used by the PC and the Compaq to write "TEST OF PROGRAM OUTPUT" to the screen 1,000 times.

It's clear that FORTRAN is significantly slower than BASIC or the DOS command TYPE. FORTRAN and a color

board screen write at about 220 characters per second, which isn't much faster than some dot matrix printers. If greater speed is necessary, the best method is to write the data to a disk file, and either view the output later using the TYPE command, or use Ctrl-PrtSc to toggle the printer on and print the output. Another alternative is to use a print spooler program and send data directly to the printer. This is fast, but can easily overwhelm a small spooler. Of course, writing your own assembly language screen-write routines should speed up output considerably.

Debugging

Perhaps the most disappointing aspect of Microsoft FORTRAN is the quality of its error messages. The longest compile-time error message is eight words, and most are less than four words. Errors that occur during linking are now shown in Appendix H of the Microsoft FORTRAN manual (an improvement over previous releases, where link errors were listed only in the DOS manual). Still, deciphering the messages is not always easy.

For example, the link error "Symbol defined more than once" is explained by Microsoft as follows: "MS-LINK found two or more modules that define a single symbol name." What this means is that a global variable such as a subroutine name is defined differently in two or more places within your program. Since the FORTRAN linker library has many named subroutines, it's easy to accidentally call one

of your subroutines by the same name as a linker subroutine, bringing on this error message. To correct the problem, simply rename your subroutine and rewrite your CALL statements.

Another problem occurs during debugging. There is no simple method to stop the program in the middle and display the value of variables. You could insert WRITE statements into the program, but this is cumbersome. Perhaps a future version of Microsoft FORTRAN will provide an improved debugging tool.

Conclusions

The Microsoft FORTRAN compiler is an excellent piece of software, and, at a retail price of about \$350, it is an outstanding value. Version 3.20 provides all the tools needed to convert most mainframe FORTRAN programs for use on the PC and represents a tremendous improvement over Version 3.13.

The support of the 8087 chip is outstanding, and the ability to read and write sequential, random access, or binary files using the OPEN command is a definite plus. The handling of character variables is well done, and the ability to perform free-format reading and writing is impressive. The ability to use the PC's entire memory for program and data storage extends its power tremendously. Microsoft provides the ability to link FORTRAN programs with Pascal or assembly language programs, which may run faster or provide extended capability. Perhaps most important, there seem to be very few bugs in this compiler, in dramatic contrast to IBM FORTRAN's 45 pages of documented bugs.

On the negative side, screen writing is slow, and the error messages are not always helpful. There are no supplied graphics commands, and there is no support for calling BASIC subroutines. Hopefully, some of these deficiencies will be corrected in future editions. On balance, though, the pluses far outweigh the minuses, making this FORTRAN compiler an outstanding product. ■

	PC w/Color Board	PC w/Monochrome	Compaq
FORTRAN	1:40	1:12	1:08
Interpreted BASIC	1:17	0:57	0:53
Compiled BASIC	1:08	0:48	0:48
TYPE	1:17	0:57	0:50
Floppy disk write	0:12	0:12	0:12
RAM disk write	0:08	0:08	0:08

Figure 5: A table comparing the times to write "TEST OF PROGRAM OUTPUT" 1,000 times on different configurations of the PC and the Compaq.

In Search of a Significant Dialog

Dialog's complex command structure makes this on-line service difficult to use. In-Search helps by leading you through it step by step.

If you've ever had trouble using an on-line information service, you'll appreciate the merits of a helping hand called *In-Search*. From Menlo Corporation, this new \$400 package is designed to make it easier to search the collection of databases offered through Dialog Information Systems, Inc., of Palo Alto, California. It is a powerful, well thought out package that will be valuable to both the professional who spends several hours a day with Dialog and the occasional user.

To understand how *In-Search* works, you need to know something about Dialog. One of the country's leading database



vendors, Dialog provides access to roughly 200 distinct databases. If you spend some time reading the service's documentation and approach Dialog in a calm, one-step-at-a-time manner, you should find that learning how to use this information service is not particularly difficult. The skills required are more often those of library science and simple Boolean logic than of programming.

The first step in Dialog searching is to

decide which database is most likely to have the information you're looking for. The documentation will help you here. First, the "blue sheets" (after the color of the paper) contain detailed information on each database, including subject matter, how it is organized and indexed, and the name of the organization that compiled the database. By the name alone you can often make an educated guess about which database is most appropriate. For example, *Patlaw* is a database on patent law.

However, you may not immediately be able to match up a subject area with one or more particular databases, or you might not know of all databases containing information on your topic. You would then turn to Dialog database #411, *Dialindex*, which is an on-line help feature. *Dialindex* lists 53 broad subject areas such as *BusNews* and *Educ*. Each term refers to two or more relevant databases. For example, included in the *BusNews* (business news) heading are Dialog's *Magazine Index*, the *National Newspaper Index*, *Newsearch*, and three other databases.

To use *Dialindex*, you type in the subject you wish to search for and one of the



In-Search

Menlo Corp.
4633 Old Ironsides, #400
Santa Clara, CA 95050
(408) 986-1200
List Price: \$399

Requires: 192K RAM, two disk drives,
300 or 1200 baud modem, DOS 2.0.

CIRCLE 800 ON READER SERVICE CARD

HARD DISK + With A Single Slot.

Unleash your IBM-PC/XT with IDT's hard disks and SCSI technology.

Innovative Data Technology is bringing unprecedented power and virtually unlimited expansion to IBM-PC/XT users. Our new SCSI (Small Computer Systems Interface) hard disk subsystems put massive storage capacity at your fingertips—from 11 to 126 MB in a single external drive. With the capacity of configuring up to 14 drives through the SCSI bus, that puts nearly two billion bytes of on-line storage at your disposal.

Single slot expansion

Unlike most PC add-ons, IDT's SCSI hard disk subsystems and other peripherals are connected through a single SCSI host adapter on your PC—no additional expansion slots or cards are necessary—future disks and other peripherals and additional PC hosts are simply daisy-chained into the SCSI bus.

Multi-user capability

IDT built the SCSI hard disk subsystem with multiple users in mind. One, two, or more IBM-PCs can access disk drives and other peripherals through the SCSI bus, allowing you to build a sophisticated system tailored exactly to your requirements.

The options are yours

With IDT's SCSI host adapter board, future expansion becomes a snap. Additional peripherals, including an extensive line of 1/2-inch IBM-compatible magnetic tape transports, are available for immediate shipment from IDT. You simply don't have to wait or worry about equipment compatibility with IDT components. Watch for 1984 announcements of streaming cartridge drives, printers, etc.

Tomorrow's solution today

IDT's SCSI host adapter and SCSI hard disk subsystems will answer your data storage and system design requirements today. Contact IDT for complete system configuration information and details on other products.

How to order:

Using the chart to your right, you may order IDT hard disk subsystems and SCSI host adapters by calling:

1-800-522-1500 Ext. 717

FOR IMMEDIATE ORDERS ONLY

Prices and availability subject to change without notice. No CODs. Send cashier's check or money order. All other checks will delay shipping three weeks. MasterCard and Visa accepted (include telephone number). Add \$12.00 for handling and shipping UPS ground within the continental U.S. California residents add 6%. Approval needed on all returns. 0-10% restocking charge on all returned merchandise.



For additional product or technical information please call or write:

**INNOVATIVE
DATA
TECHNOLOGY**

ON THE RIGHT TRACK

P.O. Box 178160 • 4060 Morena Blvd. • San Diego, CA 92117
(619) 270-3990 • TWX: (910) 335-1610

CIRCLE 110 ON READER SERVICE CARD

Successful and easy installation assured

Supplied with each component are the required cables, complete software driver package and user language instructions. The user manual will have you quickly running and appreciating the many features of the subsystems, such as quick automatic boot load of the operating system from the IDT disk subsystem.

Satisfaction guaranteed

If not satisfied, the subsystems may be returned on approval from IDT within a 10-day period. All subsystems and components carry a six-month return-to-factory warranty on parts and labor.

TO ADDITIONAL HOSTS
OR PERIPHERALS

IBM COMPATIBLE
1/2" MAGNETIC
TAPE SUBSYSTEM

ADDITIONAL
HOST

SCSI BUS

SCSI
HOST
ADAPTER

DISK
SUBSYSTEM

IBM-PC/XT HOST

Solutions
for 84 AND BEYOND

COMPONENT PRICING CHART

Model No.	Description	Storage Capacity	Price
RD 2011M	Master Disk Subsystem	11MB	\$2000.00
RD 2023M	Master Disk Subsystem	23MB	2550.00
RD 2035M	Master Disk Subsystem	35MB	2950.00
RD 2047M	Master Disk Subsystem	47MB	3150.00
RD 2126M	Master Disk Subsystem	126MB	6840.00
RD 2015S	Slave Disk Drive	11MB	1560.00
RD 2023S	Slave Disk Drive	23MB	2130.00
RD 2035S	Slave Disk Drive	35MB	2530.00
RD 2047S	Slave Disk Drive	47MB	2730.00
RD 2126S	Slave Disk Drive	126MB	6290.00
RD 8111H/A	IBM-PC/XT Host Adapter		510.00
IDT 1/2" Magnetic Tape Subsystems			Consult Factory
IDT 1/4" Streaming Back-up Tape Subsystems			Consult Factory

Ordering Example:

If your need is a 23MB Subsystem, your order would consist of the following components:
1-RD 2023M @ \$2550.00 + 1-RD 8111H/A @ \$510.00 + Shipping & Handling @ \$12.00 =
A Total Order of \$3072.00 + tax (if applicable)

IBM is a trademark of International Business Machines Corp.

IN-SEARCH

category headings. Dialindex tells you how many hits it found in each of the subsumed databases, eliminating guesswork and saving you from the frustration of searching an inappropriate database.

Once you've decided which databases to search, you can use seven fundamental commands and nine more advanced ones (see Figure 1) to actually get the data out of the database and onto your computer.

An example of Dialog's simplicity of command structure is the SELECT command, the basic command to find all references to a particular term. For example, entering SELECT WIND causes Dialog to search for all records in the selected database that mention the term *wind*.

However, *wind* can be used as a record descriptor, a record identifier, or even as an author's name. The SELECT command might therefore have several forms, such as SELECT WIND/DE or SELECT AU-WIND. The first of these two forms searches for *wind* as a subject in a record; the second searches for an article written by an author named Wind. These different formats can at times be confusing.

Dialog's databases range in cost from around \$40 to \$165 per hour. The meter runs for the full time you are connected to a database. If you sign on to SciSearch, for example (\$165 per connect hour), and take a five-minute coffee break, you're drinking a \$14 cup of coffee. You'll want to optimize your on-line time.

Masking the Power

At first glance, *In-Search* looks like an enhancement of a good telecommunications package to which some handsome graphics have been added. *In-Search* can log on to Dialog automatically, record all traffic between the user and Dialog, send break signals, and print out records transmitted from Dialog. The graphics enhancements include windowlike displays of broad subject areas, on-screen worksheets, pop-up windows for extra commands, and a section that displays basic information—such as the subject area and time period covered—about each data-

base. The advantage of this approach is that you have everything you need in front of you—no balancing the Dialog documentation on your lap as you gaze at the screen. *In-Search* also provides a plastic keyboard overlay that indicates the linkage between function keys and commands.

Its similarity to a telecommunications package, however, masks *In-Search*'s real power. Since this program allows you to prepare much of your work before logging on, "dead air" time is minimized, which saves you time and money.

The point of *In-Search* is that it helps you to clarify a search and eliminate some potential confusion; it consequently simplifies Dialog use considerably. *In-Search*'s built-in help features and detailed explanations illuminate every nook and cranny of each of its databases.

In-Search has divided all the Dialog databases into four broad subject areas: business, government, and news; engineering, mathematics, and physical science; arts, education, and social sciences;

and biology and medicine. Each of these four subject areas is on a separate "category" disk that contains specific information about each database, such as the names and contents of subfields, examples of each subfield, help information, and so forth.

Using *In-Search* is quite simple. I'll describe the process for my two-drive PC; according to the vendor, *In-Search* also runs gracefully on an XT. The manual contains detailed instructions for both types of systems, as well as for a rich variety of PC lookalikes.

To use *In-Search*, you must prepare the *In-Search* system disk. This is a familiar process; you copy DOS 2.0 onto the system disk and enter various parameters (local telephone access numbers for Telenet, Tymnet, and Uninet, your Dialog password, the type and speed of your modem, and so on). These processes are made easier by a batch file on the *In-Search* system disk and a menu-driven parameter collection system.

(continued)

Dialog has seven fundamental commands, as follows:

BEGIN: Begin searching Dialog database n.

SELECT: Select a keyword for which to search.

COMBINE: Use Boolean logic (AND, NOT, OR) to combine search results using logical calculus.

TYPE: Display search results on the user's printer.

EXPAND: Display a list of terms related to the primary search term.

PRINT: Print a list of search results on Dialog's printer and have them mailed to user.

DISPLAY: Display search results on a CRT.

There are also nine commands for more advanced work, such as EXPLAIN, KEEP (file search results), LIMIT (restrict search results in some way), SORT (sort on-line output), and other housekeeping or administrative commands.

Figure 1: Dialog's fundamental and advanced commands.

IN-SEARCH

To use *In-Search* to search Dialog, you insert the system disk in the A: drive, perform a standard boot, and type in *INS* at the prompt. At the same time, you insert one of the four category disks in the B: drive. (If you have a hard-disk system, you first copy the data on the category disks onto the hard disk.)

The first functional *In-Search* screen displays three windows. The first shows which category disk you're using; the second, a list of broad subject areas within that category; the third, a list of the relevant databases for that subject area. Each succeeding level moves you closer to your target database.

For example, suppose you're after some information about a company's earnings. You'd use the Business disk. The first usable screen displayed provides a list of broad business topics, such as accounting, acquisitions & mergers, and banking.

You then use the cursor movement keys to scroll through the list of topics. When the term "Annual Reports" is highlighted in the window, you press the Enter key, which takes you to the third window. This window displays "index cards," which contain a name and a brief description of the database. In this case, the window displays the information for Disclosure II, a business database.

Once you've settled on the specific database you want, you again press the Enter key, and *In-Search* displays a worksheet for that database. (You can also go directly to the database you want to search without going through the "topics" screen.)

Filling in the worksheets is straightforward; you enter the word or phrase you are searching for and, if necessary, instructions for Boolean searching (for example, combine all items that are common to two search results). Pressing the F9 key will give you access to special indexes and submenus that allow you to tailor your search.

In this particular case, looking for company earnings, you enter the name of the

company. Since there are more than 75 fields in this database, the most efficient way to search is to indicate that the phrase you entered (say, "Sperry Corporation") is a company name. Pressing a few keys will tell *In-Search* to limit its search to Dialog's Company Name field. The use of these additional search features is greatly facilitated by the instructions at the bottom of each screen. You don't have to press the help key (F1), although it's always available.

Another helpful feature of *In-Search* is that you don't have to worry about entering the Dialog command precisely; *In-*

All commands sent to Dialog and all information you access can be saved on a disk for later use.

Search does it for you. For instance, people who occasionally use a numeric 1 instead of a lower-case alpha L, or who use numeric 0 and alpha O interchangeably, will be spared having to resolve these differences.

Logging On

To make the connection with Dialog, you press the F5 key. *In-Search* then automatically dials Dialog, connecting directly or via Telenet, Tymnet, or another value-added network, and takes care of all the housekeeping details, such as transmitting the Dialog password and redialing if necessary. If you are using a dumb modem, *In-Search* tells you what number to dial but takes over after you've established communications. One especially nice feature of *In-Search* is a screen display that indicates your status: you're either "online," "off-line," or "working" (waiting for a response from Dialog).

If your primary pathway to Dialog is

unavailable for some reason—if, for example, the local Telenet number is busy or the Telenet port for Dialog is not available—*In-Search* will automatically try a second route and then a third, if necessary.

Dialog initially returns the number of references (or hits) it has found. Retrieving and printing these requires a separate command. To retrieve the actual references, you press the F9 key, which brings up a window with several subcommands. These are controlled again with the cursor movement keys and the Enter key.

To display the references, you hit F9 and use a subcommand, which brings up a pop-up menu. The menu asks you which hits you would like to see and in which format (there are eight Dialog display formats, ranging from short to complete). This operation soon becomes almost automatic.

All commands sent to Dialog and all information you access can be saved on a disk for later use. For example, if you conduct the same search periodically, you can enter the search strategy once and recall it later. This is particularly useful in long command sequences, which are subject to typing errors and the inadvertent skipping of some commands.

Two Perspectives

At first I was doubtful as to how valuable *In-Search* was. I am a self-taught Dialog user, though probably not an efficient one, and my first *In-Search* efforts seemed far clumsier than simply using Dialog commands directly. Learning *In-Search* seemed hardly worth the effort. This puzzled me, since the vendor was so enthusiastic and had put a great deal of effort into the package. So I asked the vendor to put me in touch with users at opposite ends of the experience spectrum—an expert and a novice.

Barbara Newlin is an information consultant and former professional researcher in Berkeley, California. She used Dialog for several hours a day over the course of 5 years and is now writing a book about the

IN-SEARCH

service. According to Newlin, using *In-Search* with Dialog is an easier way for a novice to start out because it simplifies the system. You can edit a strategy on-line while Dialog is searching, and experienced searchers need not be connected when they're putting together search strategies.

I tried to give *In-Search* a problem it couldn't solve, but it passed my tests every time.

If you multiply these savings by the number of expensive databases a searcher is likely to use, you'll save connect charges. And all the information is available within *In-Search* itself.

At the other end of the spectrum is San Francisco-based Gil Freeman, a CPA and chief financial officer of The Sharper Image, a retailer of upscale electronic, health, and fitness items via its nationally distributed catalog.

The Sharper Image's success depends heavily on getting its catalog into the hands of an affluent audience. This business buys prepared mailing lists for this purpose and supplements those lists with information culled from a Dialog database called the Electronic Yellow Pages, a compilation of dozens of Yellow Pages directories.

"I knew about Dialog but was scared off initially by its complexity," Freeman explains. "I'd attempted to use Dialog without *In-Search*, but *In-Search* made it much simpler. I'm happy with what it's done for us, and, given its abilities, it's an inexpensive product. It paid for itself. It's perfect for a novice."

After speaking with Newlin and Freeman, I returned to *In-Search* and tried to suppress the knowledge I gained from using Dialog directly. I theorized that I had tried to make *In-Search* bend to my own method of using Dialog. I fought with

it instead of letting it work on its own terms.

My subsequent efforts were considerably easier. I suppose that I'm at that awkward

stage—more knowledgeable about Dialog than many users but considerably less familiar with it than professional information retrievers. I'm therefore an



NOBODY BEATS THE SOFTMAN!

WordStar	\$235
WordStar Pro Pak	\$349
SuperCalc III	\$199
EasyWriter II System	\$189
(w/speller/mailler)	

EasyWriter I System	\$125
(w/speller/mailler)	

R: base	\$279
---------------	-------

OUR PRICES ARE THE LOWEST!

SPREADS/FINANCIAL

Lotus 1-2-3	\$319
VisiCalc IV	\$169
SuperCalc III	\$199
EasyPlanner	\$125
MultiPlan	\$155

DATA BASES

dBase II	\$269
Condor 3	\$357
EasyFiler	\$192
R Base	\$279
QuickCode	\$175

WORD PROCESSORS

Word	\$239
Word w/mauser	\$289
Multimate	\$275
WordStar Pro	\$349
EasyWriter II Syst	\$189

ACCOUNTING

IUS	
G/L A/P A/R I/C	
O/E ea	\$289
MBSI	
G/L A/P A/R O/E, I/C	
Payroll	\$349
Sales Analysis	\$179

OTHER TITLES AVAILABLE

WE SPECIALIZE IN VOLUME DISCOUNTS



SoftMan

ORDERS ONLY

1-800-821-6023

For information and in California (415) 332-5535

IN-SEARCH

atypical user. I tried to give *In-Search* a problem it couldn't solve, but it passed my tests every time. Part of my problem lies in the power of the *In-Search* command set. There's a natural trade-off between power and ease of use.

It was not necessary to tell *In-Search* what kind of printer I was using—it printed out the material I asked for, complete with boldfacing, with no problems. The manual is also quite good and easy to use. I found some places here and there that I felt could use some sharpening, but these were by no means major stumbling blocks. All manuals should be as clear and readable as this one.

The Dialog database collection for which *In-Search* is intended changes constantly. Prices fluctuate, new databases are added every month, and some databases change format on occasion. Without

In-Search printed out the material I asked for with no problems.

some update capability, *In-Search* would be out of date and useless shortly after you bought it. To address this need, the manufacturer will periodically send updates, on disk, to registered users. These will then be merged with the information already contained in *In-Search*.

Quibbling

I do have two minor quibbles about using *In-Search*. First, your password is embedded on the system disk, which means that a miscreant could "borrow"

your disks—and with them your password and Dialog account—and run up charges. (The vendor could rectify this with a minor modification that requires you to enter a counter-password.) If others are likely to "borrow" your copy of *In-Search*, keep it under lock and key.

And second, *In-Search* insulates you from Dialog's commands, which deprives you of a potential learning experience. To save you the trouble this experience would entail, of course, is the whole point. However, if you've never seen Dialog run without any intermediate software layer and you are curious about what actually goes on behind the scenes, you might find it interesting to enter the commands yourself, or at least to look over the shoulder of someone who is using Dialog that way. Doing so, incidentally, will only add to your appreciation of *In-Search*. ■

How to teach your kids about the IBM PC.

Now you can teach your children how to use your PC without bogging them down in the user manual...without spending hours demonstrating the simplest functions...and without fear that they'll break your PC because they don't know how to use it properly.

You can do it with the PC edition of *Computers for Kids*—a BASIC learning text whose Sinclair, Apple, and Atari editions have already introduced thousands of children and parents to computers.

Computers for Kids teaches children age 8 and older to write their own programs in less than an hour—without the necessity

for previous knowledge of algebra, variables, or computers. And there's a special section that keeps parents and teachers on the same successful command path.

Starting off with an easy-to-understand explanation of how to use the IBM PC, your kids will progress quickly to flow charts and simple print programs...to loops, graphics, and other programming concepts that show the young user how to make the PC do exactly what he wants—in non-technical language that makes life easier for both of you.

Take it from Donald T. Piele, Professor of Mathematics at the University of Wisconsin (Parkside): "*Computers for Kids* is the best book available for introducing children to the IBM PC. And it's a perfect tool for adults who are learning about computers and programming with their children."

So do your children a favor. Do yourself a favor. Order the PC edition of *Computers for Kids* today!



Here are just a few of the useful and exciting topics covered in *Computers for Kids*:

- What is a computer?
- Flowcharting
- Running the IBM PC
- Getting Ready to Program
- PRINT and Variables
- GOTO, INPUT and RND
- IF-THEN and FOR-NEXT
- Graphics Programs
- Sample Programs
- Glossary of Statements and Commands
- Notes for Teachers and Parents

Creative Computing Press

Dept. NPMZ, 39 East Hanover Ave., Morris Plains, NJ 07960

Send me _____ *Computers for Kids*, PC edition, at \$5.95 plus

\$1.50 postage and handling each. #12K

- ☐ PAYMENT ENCLOSED \$_____. Residents of CA, NJ and NY State add applicable sales tax. Outside USA add \$3.00 per order.
- ☐ CHARGE MY: (Charge and phone order \$10 minimum)
- ☐ American Express ☐ MasterCard ☐ Visa

Card No. _____ Exp. Date _____

Signature _____

Mr./Mrs./Ms. _____ (please print full name)

Address _____ Apt. _____

City/State/Zip _____

☐ Send me a FREE Creative Computing Catalog.

Ultimate Sorcery

Sorcerer offers up heart-pounding text adventure with plenty of wit but no gore, while Ultima II features an animated role-playing fantasy spanning a great big, wonderful world.

The mystic art of sorcery has fascinated mankind for thousands of years. Most of us don't really believe in wizards casting spells over the powers of nature, but one look at the list of adventure/fantasy films and books of recent years will convince you that we're ready to be persuaded. The literature of computer games has embraced adventure and fantasy-role-playing themes with equal vigor. Among the best current examples of these genres are, respectively, the new *Sorcerer* and *Ultima II*, both sequels to previous escapades. But despite my enthusiasm for both of them and their common theme, the games are as different as night and day.

Ultima II is a great big wonderful world that will probably frustrate the hell out of you the first few months you spend explor-



Having a drink at the Pub de Varg in *Ultima II*. Tip the talkative barkeep and he may favor you with an important clue.



ULTIMA II

Sierra On-Line, Inc.
Sierra On-Line Building
Coarsegold, CA 93614
(209) 683-6858
List Price: \$59.95

Requires: 64K RAM (DOS 1.1) or 128K RAM (DOS 2.0), one disk drive, color/graphics adapter, color monitor.

CIRCLE 749 ON READER SERVICE CARD

ing it. If you are not ready for the kind of mental gymnastics this game puts you through (which make learning to play chess look easy), you won't think it's such a great big wonderful world at all. In fact, you may call it a "stupid game" and put it on the top shelf. But if you hunger for an animated fantasy-role-playing game that lets you create an individual alter ego, and if you're ready to place the old brainpan on the front burner and bring those creative, puzzle-solving juices to a stiff boil, then

Ultima II is your meat and potatoes.

One of the big attractions of fantasy role-playing games lies in being able to create your own character, and this is the first thing you do in *Ultima II*. The package consists of three disks: a program master disk containing the game rules, a galactic disk, and a player master disk containing the game character generator. After copying the player master to a blank disk, you are ready to assign your character point values for six traits: strength,

**Looking for
FAST
DELIVERY
ON SOFTWARE**

SEE PAGE
48

LOGICSOFT

TOLL FREE
1-800-645-3491
NYS 516-741-0043
CAN 416-283-2354



CIRCLE 296 ON READER SERVICE CARD

COMPLETE YOUR LIBRARY OF PC



Add to your PC collection today. Make your personal library complete and authoritative with any issues you may be missing.

Copies are available for issues published during the last twelve months—be sure to specify the issues you want. If a particular issue is out of stock, your payment will be refunded promptly.

Back issues of PC are priced at \$6.00 each, postpaid. Outside USA, \$7.00 each.

PC
CN 1914 Morristown, NJ 07960
Please send issues of PC listed below—

MCBI

Issue	Qty.	Unit Price	Total Price
Payment Enclosed \$			

Mr./Mrs./Ms. _____ (print full name)

Address _____

City/State/Zip _____

PC ARCADE

agility, stamina, charisma, wisdom, and intelligence. You also choose your character's race (human, elfen, dwarven, or hobbit), sex (male or female), and profession (fighter, thief, cleric, or wizard).

Ultima II's high-resolution graphics make it more than a text adventure. The map of the playing board, which is much larger than a single screen, depicts the four major continents of Earth surrounded by oceans, and the map scrolls as your character moves across various terrain. Be aware that *Ultima II* is played in real time, so you can't sit around pondering what to do next. If you don't make a move within 10 seconds, the computer will "pass" for you. Physical combat is also a large part of the game. Even if you're not the belligerent type, your character must be ready to defend himself.

A Purpose in Life

The object of *Ultima II* is to search out and destroy the evil sorceress Minax. You don't know where she is, what she looks like, or anything about her modus operandi. Your character will have to discover these things and more before learning what to do, much less how to do it. Consider yourself warned.

Your character begins with just a small food supply, some gold, and several hundred "hit points" (Some of which are used up each time he sustains a blow). When your alter ego runs out of food or hit points, the game ends.

All player commands are executed with single keystrokes, but in this limitation is not bothersome because there are 30 different actions you can execute. (Wizard and cleric characters each have access to one of two special submenus offering six additional commands that represent spells.) The arrow keys make up four of the standard commands; they are used for movement. The other 26 are mnemonic commands from A to Z. For example, E means Enter, O means Offer, and S means Steal. The T (for transact) command allows you to speak to the hundreds of game characters you'll meet and you

should talk to everyone because you never know who might have valuable information. Of course, everything costs money and adventurers are not on anyone's payroll, so you have to continually replenish your character's gold supply by winning battles with the enemies and devils roaming the countryside.

Sounds like a lot of game, doesn't it? Well, get this: There are actually five maps of the world, each representing a different time period ranging from prehistoric times to 1990, and your characters can and must travel between them by slipping into time doors when they appear.

You can't solve *Ultima II* without visiting all five time periods, because each one holds items essential to the mission. For example, you can get a horse in the first time period, but not a ship, an airplane, or a rocket. A rocket? That's right—before you're through your character will have visited the nine planets of our solar system (and a few uncharted ones if you're really clever), all of which are contained on the galactic disk.

There is much, much more to *Ultima II*, but I want to leave some surprises for those of you with the mental guts to take on this "monster" game. On PC's scale of one to six, *Ultima II* rates:

FUN:	5.5
CHALLENGE:	5.5
GRAPHICS/SOUND:	4.5
TOTAL SCORE:	15.5



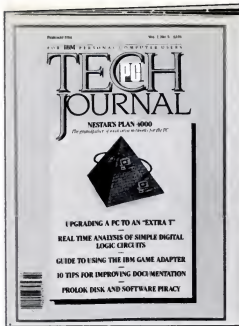
Sorcerer

Infocom, Inc.
55 Wheeler St.
Cambridge, MA 02138
(617) 492-1031
List Price: \$49.95

Requires: 64K RAM, one disk drive.

CIRCLE 748 ON READER SERVICE CARD

The folks at Infocom have a literary style that infuses their text adventures with a wonderful sense of humor, and *Sorcerer* is no exception. When I boot a game for the first time, for example, I expect to see



LET'S TALK EXPERT-TO-EXPERT

PC TECH JOURNAL, the only magazine written for sophisticated IBM PC users...talks with you expert to expert!

Do you require a magazine that provides you with the insight and knowledge to act as your silent partner when developing new programs? Have you needed to consult with authorities in telecommunications to resolve a nagging problem? Wouldn't a second opinion about connecting your PC to a main-frame be helpful? With your subscription to PC TECH JOURNAL, you're harnessing experts in your field... experts who will talk to you in the language you understand, about the concerns you have...**EXPERT TO EXPERT!**

PC TECH JOURNAL is the technologically sophisticated magazine written for experts in the field of personal computing like yourself...discussing the concerns experts have...developing elegant programming methodologies only experts can understand...covering the whole field of IBM PC's with thought-provoking articles on communications, distributed processing, office automation, networking and programming.

Subscribe today and save up to 36% off the full subscription price, and have PC TECH JOURNAL delivered to your home or office every month! From One Expert to Another: subscribe today!

TECH JOURNAL

P.O. Box 2966, Boulder, Colorado 80322 PT8H64

YES, I want to communicate with other experts and professionals about IBM PC's and compatible machines! Please enter my subscription to PC TECH JOURNAL for:

- ☐ One year (12 issues) for \$24.97—SAVE 17%!
☐ Two years for \$43.97—SAVE 27%!
☐ Three years for \$57.97—SAVE 36%!

Mr./Mrs./Ms. _____ please print name in full

Company _____

Address _____

City _____ State _____ Zip _____

Savings based on full one year subscription price of \$29.97.

Check one: ☐ Payment enclosed. ☐ Bill me later.

Charge my: ☐ American Express ☐ Visa ☐ MasterCard

Card No. _____ Exp. Date _____

Add \$12 a year in Canada and all other foreign countries. Please allow 30 to 60 days for delivery of first issue.

COMPU MAIL



IBM PC \$1799

64K, two disk drives 360K each, Drive Controller and Keyboard

WE CUSTOMIZE IBM PC SYSTEMS

IBMPC w/10MB

128K, one floppy Drive, Keyboard
10 MB Hard Disk with Controller

\$2599

PRICE WAR ★ CALL US LAST WITH YOUR BEST QUOTES

FLOPPY & HARD DRIVES

* TEAC 55B-slimline D50D	\$149
TANDON 100-2, full height, D50D	\$199
CONTROL DATA - full height, D50D	\$219
CONTROL DATA - half height, D50D	\$179
MAYNARD Hard Disk System with Backup	CALL
EVEREX Hard Disk Systems with Backup	CALL
TALLGRASS TECH Hard Disk Systems to 70MB	CALL

MONITORS

* PGS HX-12	\$459	MAX-12 Amber	\$179
* PGS SR-12			\$599
AMDEK 300 Green			\$129
300 Amber	\$139	310 Amber	\$159
SANTA CLARA SYSTEMS PC Terminal			CALL

PRINTERS

* EPSON FX-80	\$489	EPSON FX-100	\$599
OKIDATA 92 P	\$399	OKIDATA 93 P	\$649
OKIDATA 84 P	\$799	PACEMARK	CALL
* Ababi LQ-20, Ltr. Quality Printer			\$349
NEC SPINWRITER 2050			\$888
3550	\$1,666	7730	\$1,888
BROTHER HR-1	\$489	HR-25	\$689
IDPS PRISM 132C Color Printer			\$1,499
SHEET FEEDERS & TRACTORS			CALL

MULTI-FUNC. / DISPLAY CARDS

* NEW Quadboard 0-K (to 384K)	\$209
* AST SIX PAK 64K (to 384K)	\$259
HERCULES Mono Graphics Card	\$329
HERCULES Color Graphics Card	CALL
QUAD COLOR I	\$199
COLOR II	\$209
* EVEREX Graphics Edge	\$399
TECHMAR Graphics Master	\$488
* AST MegaGraphPlus with Clock & Printer Port	\$349
PLANTRONICS ColorPlus	\$346
PARADISE MultiDisplay Card	\$346
Tseng Labs Ultra PAK	\$499

MODEMS / MISC.

* MICROCOM ERA 2 Int. Modem w/Software	\$299
HAYES 1200 B	\$399
HAYES 1200	\$499
QUADBOARD Internal or External	\$199
* KEYTRONICS Deluxe Keyboard K85151	\$119
ORCHID TECH PCWAPLUS	CALL
BACKUP POWER SUPPLY provides surge protection and up to 30 minutes of standby power	\$299
Computer Accessories Power Director	\$109
* MAYNARD Floppy Drive Controller	\$159

64K RAM \$45

Set of 9 chips

TEAC Disk Drive \$149

FD55B, 360K slimline, PC Compatible

AST SIX PAK 64K \$259

10MB HARD DISK \$899

Backup also available

MAYNARD \$159

Floppy Drive Controller

KEY TRONIC \$199

Deluxe Keyboard K85151

AST MegaGraphPlus \$399

Includes Clock, Parallel Port and Serial Port

ERA 2 MODEM \$299

PC Internal 1200 Baud with Software, 4 year warranty

QUADBOARD \$209

New 9 function, expandable to 384K

Ababi LQ-20 \$349

Ltr. Quality Printer, 18 CPS, 13" wide, Uses Dime Print Wheels

EVEREX \$399

GRAPHICS EDGE

PGS \$179

MAX-12 \$179

HX-12 \$459

SR-12 \$599

EPSON \$489

FX-80 \$489

FX-100 \$599

Parallel Printer \$20

CABLE

Lifetime Warranty

IBM PC DOS 1.1 \$25

WE SPECIALIZE IN IBM PC & PERIPHERALS

Ad. #788

Prepared 6/84 Please call for latest LOW prices.



COB NO SURCHARGE: VISA & MC 3%, AMEX 5%

COMPUMAIL 805-498-6635

2509 THOUSAND OAKS BLVD., THOUSAND OAKS, CA 91362

TELEX 688522

CIRCLE 234 ON READER SERVICE CARD

PC ARCADE

a traditional title and copyright screen. When I booted *Sorcerer*, however, the screen read: "You are on a path through a blighted forest. The trees are sickly, and there is no undergrowth at all. One tree here looks climbable. The path, which ends here, continues to the northeast. A hellhound is racing straight toward you, its open jaws displaying rows of razor-sharp teeth."

I hadn't done anything yet, but I was already in big trouble. I figured the hellhound would overtake me if I took the northeast path, so I typed in the command CLIMB THE TREE and hit the Enter key. The computer countered with "You are on a large gnarled branch of an old and twisted tree. A giant boa constrictor is slithering along the branch toward you! The hellhound leaps madly about the base of the tree, gnashing its jaws."

Gadzooks! Then a series of progressively more worrying sentences were followed by a lightning bolt striking my character's chest, causing him to wake up in a cold sweat and realize he had been dreaming! Then came the expected copyright screen. Before I had even entered the game, Infocom was controlling my heartbeat.

Enchanter series

Sorcerer is the second game in the Enchanter series. If you're familiar with the first, *Enchanter* itself, you'll feel right at home with the setting. In *Sorcerer*, Belboz, chief cheese of your Enchanter's Guild (who was always there to resurrect you in *Enchanter*), has been kidnapped. You don't know who did it or where Belboz is being held. It would be nice to have some help, but when you wake up in a cold sweat from your dream, you find a note from Frobar, another enchanter, which says he has taken everyone else into town to go shopping. There is no one in the eerie guild hall but yourself, and leaving is no easy task. Sorcery is a lonely business.

The world outside the Enchanter's Guild Hall is expansive, consisting of hun-

...SORRY CHARLIE
FOR LEAVING
YOU OUT!



FEATURES

INCLUDE:

16 Bit CPU
With 128K RAM Memory
Expandable to 256K,
Two 320KB Slimline
Disk Drives,
Floppy Disk Controller,
Monochrome Monitor and
Adapter, Parallel and
Serial I/O's.

FOR MORE DETAILS

CALL OR WRITE

TO: TAVA CORPORATION

16861 Armstrong,
Irvine, California 92714
714/261-0200

Headquarters/Telex: 181667

Answer Back COMPOSHACK IRIN

CIRCLE 375 ON READER SERVICE CARD

IBM® COMPATIBILITY AFFORDABLE PRICE TAVA PC

**THE SMART COMPUTER USER
WANTS REAL VALUE WITH
IBM COMPATIBILITY!**

THE TAVA PC. The ultimate Personal Computer. It gives you IBM PC® Compatibility at a fraction of the cost. Choosing a personal computer is a difficult decision. But, when your decision is a TAVA PC, it's not hard at all! The TAVA PC runs under DOS 1.1, 2.0, CP/M86®, and p-System®. You can choose from a large library of all the most popular IBM PC software products such as dBaseII®, Lotus 1-2-3®, Visicalc® and thousands more.

CP/M86 is a registered trademark of Digital Research, Inc.
UCSDp is a registered trademark of Borland Microsystems

IBM PC is a registered trademark of IBM Corp.
Visicalc is a registered trademark of VisiCorp



© DVA CORPORATION 1983
trademark of AMSTON-DATE, Inc.

PCalifornia residents add 6% sales tax.

dBASE II is a registered trademark of Lotus Development

PC ARCADE

dreds of interesting, strange, and well-described places. You'll explore dungeons and torture chambers, read to your heart's delight in a seemingly endless encyclopedia, examine intricate wall carvings, paintings, and statues, cruise an underground highway, negotiate a three-dimensional maze of mirrors, and take the wildest roller coaster ride of your life in an amusement park that seems to have been created solely for your amusement.

Nonviolent

What really makes *Sorcerer* stand out from the crowd of text adventures is its predisposition against violence. You won't find any guns or knives or clubs with which to battle your enemies. Instead, your tools are scrolls that contain spells and vials that hold potions with which you can cast spells. You begin the

game with three beginner's spells and a magic book into which each new spell must be written before it can be used.

There are three modes of play (or skill levels) in *Sorcerer*: superbrief, brief, and verbose. The game defaults to the brief mode, which gives you a full description of every scene the first time you visit it. On return to that scene you will only get a description of pertinent objects or things that have changed. The verbose mode gives full descriptions of all rooms every time you visit them. And superbrief is just what it sounds like; you get the name of the location only and must ask for fuller descriptions of any items in the room. These modes may be changed any time you feel you're getting too much or too little information.

Sorcerer often presents several ways to accomplish a task, and while one way

might make your next task easier, another might make it more difficult or even impossible. So when you feel stuck, back-track and try another approach, carefully noting any differences in the results. The puzzles of *Sorcerer* are quite difficult and intricately woven together, and no help is available without writing to Infocom. (The fictitious Bilk & Wheedle Fiduciary Insurance Company, set up by Infocom, will mail you clues for \$3.)

PC's three-part, one-to-six rating scale is not quite fair to a text adventure game without graphics and sound, but *Sorcerer* conjures up impressive scores in the other two categories:

FUN:	5.5
CHALLENGE	5.0
GRAPHICS/SOUND:	Nonapplicable
TOTAL SCORE:	10.5

CALL TOLL FREE 1-800-528-1054

COMPUTER WAREHOUSE

PRINTERS

Brother HP-25
Dx-15
C. Itoh
8910 Parallel (Printer)
8910 BPI
P-10 Parallel
50 CPS Parallel
Comex
CR-15 Parallel
CR-31

Computers International
Quattrover 2000 w-48K

Dialbo

6201A1
630 API
630 ECS-IBM

Epson

All Printer Models
Inforunner

Juki

8100
NEC

Okidata

All Printer Models
Panasonic

1090
1091
1092

PRINTERS

Quimo
Letter Pro 20 Parallel
11-40 W/IBM Interface
11-55 W/IBM Interface

Silver Reed
EXP200 Parallel
EXP500 Parallel
EXP550 Parallel
EXP-710 Parallel

Star Micronics
All Printer Models

Tally

Sprint 80
180L W/Tractor
180S W/Tractors

Toshiba

P1340 Parallel
P1361 Parallel

Transstar

120 Parallel
130 Parallel

Call

5719

5739

5759

5779

5799

5819

5839

5859

5879

5899

5919

5939

5959

5979

5999

6019

6039

6059

SPECIAL OF THE MONTH

MAXELL

MD-2 (Qty 100)

\$225

QUADRAM

Quadlink
Quadboard 256K (Expands to 384K)
Quadboard II 256K (Expands to 384K)

MONITORS

Amdak
310 Amber
Princeton Graphic
V6-10

DISKETTES

Elephant
5 1/4 DS-100 (Qty 100)

Maxell

MD-2 (Qty 100)
Scotch
5 1/4 DS-100 (Qty 100)

See Special above

COMPUTERS

Eagle
PC-2 W/ Eagle Adapter & Monitor
Sprint 2

Sanyo

MBC 550 W/Printer
MBC 555 W/Printer
MBC 550-2 W/Printer
MBC 550-2 W/Printer

Zenith

All 2-160 & 2-180 Models

MODEMS

Hayes

Smart modem 1200B

Call

51199

51499

51799

52099

52399

52699

52999

53299

53599

53899

54199

54499

54799

55099

55399

55699

55999

56299

56599

56899

57199

57499

57799

58099

58399

58699

58999

59299

59599

59899

60199

60499

60799

61099

61399

61699

61999

62299

62599

62899

63199

63499

63799

64099

64399

64699

64999

65299

65599

65899

66199

66499

66799

67099

67399

67699

67999

68299

68599

68899

69199

69499

69799

70099

70399

70699

70999

71299

71599

71899

72199

72499

72799

73099

73399

73699

73999

74299

74599

74899

75199

75499

75799

76099

76399

76699

76999

77299

77599

77899

78199

78499

78799

79099

79399

79699

79999

80299

80599

80899

81199

81499

81799

82099

82399

82699

82999

83299

83599

83899

84199

84499

84799

85099

85399

85699

85999

86299

86599

86899

87199

87499

87799

88099

88399

88699

88999

89299

89599

89899

90199

90499

90799

91099

91399

91699

91999

92299

92599

92899

93199

93499

93799

94099

94399

94699

94999

95299

95599

95899

96199

96499

96799

97099

97399

97699

97999

98299

98599

98899

99199

99499

99799

100099

100399

100699

100999

101299

101599

101899

102199

102499

102799

103099

103399

103699

103999

104299

104599

104899

105199

105499

105799

106099

106399

106699

106999

107299

107599

Great Summer Reading: A Dynamic Duo

Follow along as a master of computer game design explains his craft, or delve into a compendium of useful, interesting information about the history and principles of computing.

Since the aspiring game designer has little literature to study, any book on the subject ought to be welcomed by game players everywhere—and this one deserves a herald of trumpets. Although not a professional author, Chris Crawford's qualifications for writing a book on this subject are impressive. In 1979, after many years of designing and playing board games, Crawford became a computer-game designer for Atari, where he authored *Energy Czar*, *Scram*, *Tanktics*, *Eastern Front*, *Legionnaire*, *Excalibur*, and *Gossip*. He currently leads Atari's Games Research Group. I recommend his book to those interested in designing games or merely in playing them.

Crawford hopes to awaken the public as well as the game designer to his vision

of computer game design as an untapped art form. "People are beginning to realize that the world of computer games is a vast wasteland," he writes in the preface. Crawford attributes this situation not to



technical limitations of the medium itself nor the programming skills of the designers, but to the fact that "the technology of computer games has been in the hands of technologists, not artists."

The book begins with a definition of games in general and a discussion of some of the reasons people play them. The chapter called "A Taxonomy of Computer Games" breaks the field into generally established categories, with discussions of classic games like *Space Invaders*, *Pac-*

Man, *Apple Panic*, and *Temple of Apshai* provided as background material. Crawford's point here seems to be that skill-and-action games are the entry point into the world of computer games.

In another chapter, Crawford examines the role of the computer as a game technology, detailing the strengths and weaknesses of the medium and how each can be exploited to advantage or ignored to disadvantage. Essentially, this chapter amounts to half a dozen flexible rules or design precepts that, Crawford argues, are not heeded by most software programmers. In his view this has given rise to the "humongous heap" school of computer game design in which an overly simplistic structure is buried under its special features. "These people design with a shovel instead of a chisel," writes Crawford.

Design and Programming

Crawford sees the processes of game design and programming as two separate skills. Despite this, he argues, the two must work in unison and must both come from the same creative mind. "Committees are good for generating red tape, deferring decisions, and shirking responsibility," he writes, "but they are useless when it comes to creative efforts."

The most valuable feature of *The Art of Computer Game Design* is Crawford's use of his own game designs to illustrate how

The Art of Computer Game Design: Reflections of a Master Game Designer

Chris Crawford
Osborne/McGraw Hill
830 Bancroft Way
Berkeley, CA 94710
(415) 548-2805
Copyright: 1984
Cover Price: \$14.95
ISBN 0-68134-117-7

CIRCLE 789 ON READER SERVICE CARD



CONDOR jr. Data Management Software

**Condor's
IBM™PC-compatible file management software is
one of the easiest and most complete MENU
assisted file managers today, and for just \$195.**

**Would you buy a file manager that can't add two numbers? Of course
you wouldn't. PFS FILE™ contains no arithmetic capability and can't
even balance a checkbook!**

**Condor jr. offers all the benefits of PFS FILE™ plus the ability to easily balance your check-
book, total your purchase orders, average grades and even monitor your tax deductible
expenses. This is in addition to your normal mailing list and other file management tasks.
Unlike PFS FILE™, Condor jr. also offers report writing at no additional cost.**

**Condor jr. allows you to upgrade to Condor3 and save money as your needs grow. You can
move to a fully relational database without redoing your system. A \$195 discount off Condor3
also makes it easier.**

**Since Condor has years of data management experience — we have a proven growth path
for you. Condor jr. has been especially designed for the first time
user. Not surprisingly, it is designed directly from Condor 3 — a
fully relational database that is being used in over 100,000
businesses today.**

**To find out more about Condor jr. and the demonstration-
pack software, see your personal computer dealer, or call
1-800-221-8479 (in Michigan call
0-313-769-3992 collect) for the dealer nearest you.**

IBM is the registered trademark of International Business Machines Corp.
PFS File is the registered trademark of Software Publishing Corp.

CIRCLE 300 ON READER SERVICE CARD



condor

2051 South State Street Ann Arbor, MI. 48104 313-769-3988



BOOK REVIEW

things can go right or wrong. He is not above using his own failures as examples, and some of his stories are amusing and interesting beyond their value to the budding game designer. An entire chapter devoted to the development of his recent *Excalibur* game should convince the skeptical that the design of a computer game depends on more than just a good idea.

The book ends with a discussion of the future of computer games. Crawford feels that game designers shouldn't depend on holography, laserdiscs, body sensors, and other futuristic technologies. He admits limitations of current home computer systems, but steadfastly maintains that artistic immaturity is an even greater liability. "If Chaplin could do so much with black and white film and no sound, why cannot we do good work with 8 bits and 48K?"

—Phil Wiswell

Overcoming Computer Illiteracy

Susan Curran and Ray Curnow
Penguin Books
40 W. 23 St.
New York, NY 10010
(212) 807-7300

Copyright: 1983
Cover Price: \$12.95
ISBN 0-14-007159-8

CIRCLE 788 ON READER SERVICE CARD

The Penguin Computer Book, published last year in Great Britain, has now been issued in the United States under the new and rather awkward title, *Overcoming Computer Illiteracy*. It could be a worthwhile addition to your library.

Susan Curran and Ray Curnow, the authors, are identified as a husband and wife team with strong backgrounds as

both writers and consultants in computer engineering. Curnow participated in a 1978 government study on the impact of micro-electronic technology. Curran has written several computer-related books for lay audiences.

No attempt has been made to adapt the writing to an American audience. Prices are given in pounds, figures are totted up, and so forth. These eccentricities are charming rather than annoying.

Fortunately, this is a book about computing, not computers, for there are too many books devoted to hardware and how to choose it. Computing, on the other hand, is what the hardware is for. The authors assume little or no knowledge of either electronics or computers on the part of the reader. They only presume a degree of intelligence and curiosity.

Curran and Curnow first consider dif-

telesoft

CALL
TOLL
FREE

Order Line: 1-800-426-6659 Order Processing & Other Information: 602-224-9345 Order Line Hours: Mon-Fri 8:30 - 5:30 Saturday 9-11
Address: 1943 East Indian School Road Suite 194 Phoenix, Arizona 85016



Prices reflect a 3% to 5% cash discount. Shipping \$3.00 per order.
Send cashier's check or money order. All other checks will delay shipping two weeks.
Prices & availability subject to change without notice.

SOFTWARE SPECIALS

d BASE II	\$289	SYMPHONY	\$475
d BASE III	\$419	UPGRADE TO SYMPHONY	\$145
UPGRADE TO d BASE III	\$145	TOBIAS MANAGING YOUR MONEY	\$119
FRAMEWORK	\$450	VOLKSWRITER DELUXE	\$165

Broderbund	
Book Street Writer	\$ 48
Micropro	
Wordstar II Tutor	230
Wordstar II Tutor	240
Wordstar Pro Pack	149
Microsoft	
The Word	229
The Word w/Module	289
Satellite Software	
Personal Word Perfect	116
Word Perfect	249
Software Publishing	
PS Writer	84
PS Proof	81
Software Systems	
Multimate	249

American Training Institute	
All for IBM	\$ 45 ea.
Colex	
Colex for IBM	43 ea.
Davidson & Assoc.	
Speed Reader II	45
Lightening	
MasterType	30
Mosco	
Jim Fix Running Program	45
Microsoft	
Flight Simulator (New Version)	32
Simon & Schuster	
Typing Tutor II	30

Hayes	
Smartcom II	\$ 88
Microsoft	
Coastline XVI	99
Software Publishing	
PS Access	99
Woll Software	
Move II	88
Lotus	
Lotus 1-2-3	\$205
Microsoft	
Multipoint	124
Software Publishing	
PS Graph	81
PS Report	71
Serbin	
SuperCalc 3	210

Continental	
Home Acc'd Plus	\$ 85
Mangram	
Dorian & Sense	96

Alpha Software	
d Base Manager II	\$168
Applied Software Technology	
Versatrim (PC & XT)	238
Auction-Tale	
d Base II	Call
Friday	169
Conder Software	
Condor II	328
Harvard Software	
Harvard Project Mgr	229
Living Videotext	
Think Tank	109
Main Street Software	
Main Street Mail	175
Micro DB Systems	
KnowledgeMan	278
Microgram	
d Base 4000	278
Clouff	
Extended Report Writer	89
Software Publishing	
PS File	81
Shoreware	
Advanced DB Master	267
SP1	
Open Access	\$339

Funk Software	
Schwartz	\$ 29
Peter Norton Utilities	
Function Utilities 211	80
Boasoft	
Prokey 3.0	79

For your Macintosh software needs call 1-800 MAC ONLY • Send for the new Software Advisor newsletter

CIRCLE 128 ON READER SERVICE CARD

It all adds up...

AST RESEARCH		
MEGA PLUS II	as low as	\$399.00
COMBO PLUS II	as low as	\$479.00
10 PLUS II	as low as	\$139.00
SIXPAK PLUS	as low as	\$249.00

MAIN FRAME		
AST-6851		\$699.00
AST-681A		\$899.00
AST-68C		\$999.00
AST-3870		\$749.00

MONOGRAPH PLUS		
Video Board		CALL

IDE Associates		
IDEBoard MPR-64	as low as	\$219.00
IDEplus XPS-64 CSP	as low as	\$279.00
IDEAMAX XPS-64 CSP	as low as	\$279.00
IDEAMAX XPS-64 CSP	as low as	\$229.00
IDEAscan CPR-3878		\$799.00

IDEAdisk		
SMB to 68MB Hard-drives with removable		
Cart. back-up	as low as	\$159.00

QUADRAM		
Quadlink 64K		\$479.00
Quadboard II	as low as	\$309.00
New Expanded Quadboard as low as		\$979.00
Quad 16 Plus	as low as	\$259.00
Quad 10	as low as	\$199.00

QUADCOLOR		
Quadcolor I		\$399.00
Quadcolor II (640 x 300)		\$449.00
Upgrade 14		\$699.00

QUADRIX		
6, 12, 20, 27, 72 Meg	starting at	\$1799

CHRONOGRAPH		
Clock/Calendar		\$89.99

PARALLEL BOARD		
Printer Interface w/ Cable		\$89.99

QUADJET		
Q-9000 Ink Jet Printer		\$749.00

MICROFAZER		
Call for Configurations PP, PB, SB, SP		
Starting at		\$159.00

EPFAZER		
Epson Internal Buffers		\$399.99

6K		
6K		\$149.00

AMDEK		
MAI		\$499.00

HERCULES		
Monochrome Graphics		\$359.00

EAGLE		
PC Color Card		\$229.00

PARADISE		
Multi-Display Card		\$429.00

TAC		
TRMA SEVO		\$1049.00

PC PLUS PRODUCTS		
Planitronics Color Plus		\$699.00

PEACOCK		
For product information		CALL

TECMAR		
For product information		CALL

KEYTRONICS		
6851 Keyboard		CALL

MEMORY CHIPS		
4096 Ram Chips (w/ of 8)		\$49.99

KOALA		
Koala Pad w/Micro Painter		\$99.99

MICROSOFT		
Multi-Tool Word w/Mouse		\$299.00

MODEMS		
ANCHOR		
Volkemodem		\$199.99
Mark VI		\$199.00
Mark XII		\$299.00

HAYES		
300		\$199.00
1200B		\$149.00
1200C		\$149.00
SmartComm II		\$79.99
Chronograph		\$199.00

NOVATION		
J Cat		\$99.99
Smart Cat Plus		\$399.00
Smart Cat 108		\$199.00
Smart Cat 103/912		\$439.00

MICROSTUF		
Grantalk XVI		\$139.00
Remote		\$99.99

MONITORS		
AMDEK		
3000		\$149.00
300A		\$159.00
300A		\$199.00
Color II Plus RGB		\$399.00
New Color 300,400,600,800,700		Call
Color 4 31RM RGB		\$699.00

BMC		
1201		\$89.99
1201 Plus		\$99.99
919K Color Plus		\$249.00

NEC		
JS 1201 Green		\$149.00
JS 1209 Amber		\$159.00
JO 1215 Color		\$299.00
JO 1215 RGB		\$499.00

PRINCETON GRAPHICS		
Max 12 Mono		\$199.00
RX 12 RGB		\$499.00
RS 12 RGB		\$699.00

QUADRAM		
6400 RGB		\$499.00

TAXAN		
3000 Green		\$129.00
300A Amber		\$139.00
210 RGB		\$299.00
480 H Res RGB		\$499.00

ZENITH		
ZVM 120 Amber		\$99.99
ZVM 123 Green		\$109.99
ZVM 124 12M Amber		\$149.00
ZVM 131 Color		\$309.00
ZVM 133 RGB		\$499.00
ZVM 135 RGB Composite		\$699.00

DISK DRIVES		
TANDON		
5 1/4" 320K TM 100-E		\$199.00

PERCOM HARD DRIVES		
5 Meg w/Controller		\$1049.00
10 Meg w/Controller		\$1349.00
20 Meg w/Controller		\$1699.00

PRINTERS		
BMC		
FX 50		\$299.00
40Letter Quality		\$599.00

C.I.TOH		
560P		\$379.00
A10P		\$699.00
Y10-40P		\$699.00
Y10-90P		\$1499.00

COMREX		
Comewriter II		\$499.00

DAISYWRITER		
2000		\$999.00

DIABLO		
680		\$949.00
680		\$1749.00

EPSON		
EX50, EX50P, EX100		CALL
FX80, FX80P		CALL
LQ 1500		CALL

IDS		
Prim 80/130		CALL

JUKI		
6100		\$499.00

MANNESMANN TALLY		
4800 80		\$699.00
160L		\$699.00
150L		\$799.00

NEC		
5083		\$399.00
5025		\$599.00
2080		\$699.00
3080		\$1099.00
7780		\$1799.00
5880		CALL

OKIDATA		
59, 63, 64		CALL
59, 95, 9550, 9410		CALL

OLYMPIA		
Compact 2 Letter Quality		\$479.00
Compact 80		\$809.00
EW 3000		\$1499.00

SILVER REED		
500		\$449.00
550		\$549.00
770		\$699.00

SMITH CORONA		
TP-1000		\$449.00

STAR GEMINI		
30X		\$279.00
15X		\$399.00
Radix 10		\$599.00
Radix 15		\$699.00

TOSHIBA		
1340		\$899.00
1361		\$1499.00

TRANSTAR		
120P		\$499.00
130P		\$599.00
315 Color		\$1499.00

COMPUTER MAIL ORDER

west
VISA
800-648-3311
 In NV call (702)588-5854, Dept. 140
 Order Status Number: 588-5854
 P.O. Box 8689
 Stateline, NV 89449

canada
Ontario/Quebec 800-268-3974
Other Provinces 800-268-4559
 In Toronto call
 (416)528-0866, Dept. 140
 Order Status Number: 628-0866
 2506 Dunwin Drive, Unit 35
 Mississauga, Ontario, Canada L5L1T1

east
MasterCard
800-233-8950
 In PA call (717)327-9875, Dept. 140
 Order Status Number: 327-9875
 Customer Service Number: 327-1480
 477 E 3rd St., Williamsport, PA 17701

No risk, no deposit on C.O.D. orders and no waiting period for certified checks or money orders. Add 5% (minimum \$5) shipping and handling on all orders. Larger shipments may require additional charges. NV and PA residents add sales tax. All items subject to availability and price change. Call today for our catalog.

the best prices

CALL FOR YOUR

FAVORITE

PC/COMPATIBLE

Sanyo

TeleVideo

Zenith

Columbia Data

Compaq

Eagle

ASHTON TATE

Framework	CALL
DEASE II	\$299.00
DEASE III	\$429.00
Fredguy	\$179.00
Bottom Line Strategist	\$299.00
Financial Planner	\$429.00

BenchMark

Word Processing	\$199.00
Mailing List	\$99.99

CDEX

Training Programs	each \$49.99
-------------------	--------------

CONTINENTAL SOFTWARE

Home Accountant Plus	\$85.99
1st Class Mail	\$79.99

FOX & GELLER

OGE	\$299.00
Grafix	\$199.00
dtrial	\$89.99
Graph	\$109.00
Quickcode	\$199.00

IMSI

4 Point Graphics	\$139.00
Keybase	\$169.00

IUS

EasyFlair	\$229.00
EasyPlanner	\$199.00
EasyWriter II (spell/write/mail)	\$249.00

LEXISOFT

Spell Check	\$199.00
Spell Binder	\$239.00

LIFETREE SOFTWARE

Volkwriter	\$135.00
Volkwriter Deluxe	\$199.00

LOTUS

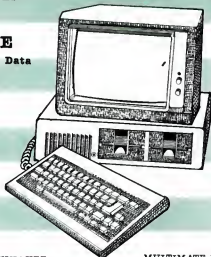
1-2-3	\$319.00
Symphony	\$549.00

MICROPRO

Infostar	\$299.00
DataStar	\$179.00
Word Plus PC/The Boss	\$349.00
WordStar	\$299.00
MailMerge	\$199.00
WordStar/MailMerge	\$339.00
PRO PACK	\$399.00
SpellStar	\$199.00
CalcStar	\$99.99

MICROSOFT

Multi Plan	\$199.00
------------	----------



SPINNAKER

Fraction Power	\$34.99
Story Machine	\$24.99
KinderComp	\$28.99
Paemaker	\$24.99
Key Diddle Diddle	\$22.99
Rhymes & Riddles	\$22.99
Snooper Troops 1 or 2	\$24.99
Search of Most Amazing Thing	\$24.99

INFCOM

Witness	\$29.99
Enchanter	\$29.99
Planetfall	\$29.99
Suspended	\$29.99
Starcross	\$27.99
Sork 1, 2, or 3	\$27.99
Infidel	\$29.99

CENTRAL POINT

PC Copy II	\$32.99
------------	---------

DISKETTES

MAXELL	
MD-1	\$21.99
MD-2	\$29.99
VERBATIM	
85/DD	\$28.99
D5/DD	\$24.99
ELEPHANT	
85/DD	\$17.99
85/DD...	\$21.99
D5/DD	\$28.99

MULTIMATE INT.

Multi Mate	\$289.00
------------	----------

PEACHTREE SOFTWARE

Peachtree 8000	\$229.00
Peachtree (OLAPAR)	\$219.00

PFS

File	\$99.99
Report	\$79.99
Graph	\$99.99
Write	\$99.99

SOFTWARE ARTS

TK Solver	\$479.00
-----------	----------

SYNAPSE

File Manager Plus	\$89.99
-------------------	---------

VISICORP

VisiCalc 4	\$199.00
VisiWordSpell	\$249.00
VisiFile	\$199.00
VisiSchedule	\$199.00
Desktop Plan	\$199.00
Business Forecast Model	\$75.99
VisiFuture Word	\$99.99
VisiOn Calc	\$249.00
VisiOn Graph	\$199.00
VisiOn Word	\$249.00
VisiOn Mouse	\$299.00

MICROMIM

R Base 4000	CALL
-------------	------

PROFESSIONAL SOFTWARE

PC Plus/The Boss	\$309.00
------------------	----------

FUNK SOFTWARE

Sideways	\$49.99
----------	---------

COMPUTER MAIL ORDER

west

800-648-3311

In NY call (702) 899-5054, Dept. 140
Order Status Number: 588-5884
P.O. Box 8689
Stateline, NV 89449

canada

Ontario/Quebec 800-268-3974
Other Provinces 800-268-4559

(416) 828-0885, Dept. 140
Order Status Number: 828-0885
2508 Dunwin Drive, Unit 38
Mississauga, Ontario, Canada L5L1T1

east

800-233-8950

In PA call (717) 327-9578, Dept. 140
Order Status Number: 327-9578
Customer Service Number: 327-1450
477 E 3rd St., Williamsport, PA 17701
CIRCLE 183 ON READER SERVICE CARD

CANADIAN ORDERS: All prices are subject to shipping, tax and currency fluctuations. Call for exact pricing in Canada. INTERNATIONAL ORDERS: All orders placed with U.S. offices for delivery outside the Continental United States must be pre-paid by certified check only. Include 3% (minimum \$5) shipping and handling. EDUCATIONAL DISCOUNTS: Additional discounts are available to qualified Educational Institutions. APO & FPO Add 3% (minimum \$5) shipping and handling.

BOOK REVIEW

ferent means of storing, manipulating, and presenting information, which they then relate to binary arithmetic. They touch briefly on electronic theory before going

on to logic gates (which have been explained in a more elementary and understandable fashion elsewhere—Joseph Be-kin's *The Electronic Cottage*, for exam-

ple). What the reader derives from the book is an understanding of various computer-related principles and their relationship to computer construction and output.

Brief History

The history of computing is covered briefly in an early chapter that proceeds logically and informatively from the abacus through analog calculators to computers. Babbage, Lovelace, Boole, Turing, and all the other pioneers are given due credit. This chapter also includes a description of early devices used for input, storage, and presentation of computed information. I learned that the "delay line," a long tube filled with fluid, was an early storage device in which sonic signals held and stored information. Other chapters cover today's computer technology.

The single thing that impressed me most about *Overcoming Computer Illiteracy* is its completeness. Everything is here, and everything is explained. Further, the book is supported by an excellent glossary, a good index, and an adequate bibliography.

As I read it, I constantly ran into definitions and explanations of those computer-related terms that we all think we understand in context but can't really define (such as "duplex" and "asynchronous"). Programming at all levels, from machine code through the high-level languages, is explained, as are the differences between program compilers and assemblers and the use of flowcharts in programming.

Some material here is not really pertinent to American readers, such as a short chapter on the Emma, a training computer that is not, as far as I am aware, available in this country, and another on how the U.K. Meteorological Office uses computers. The TRS 50 is used as an example of a small business computer and there's no mention at all of IBM's contributions to microcomputing.

If you're looking for a basic, well-written, serious background text that covers the whole subject of computing, this is a fine choice. —A. Scott Earle

PROGRAMMER'S GUIDE TO CP/M

EDITED BY SOL LIBES



Here's an important collection of CP/M insights that you'll never find in any CP/M manual. CP/M is the most popular microcomputer DOS in use today, and this widespread use has generated many innovative techniques and enhancements of CP/M. *Programmer's Guide to CP/M* tells you what these enhancements are and how to put them to use, how to get around apparent limitations of a CP/M system and why CP/M is far more versatile than you might have imagined. Every article in *Programmer's Guide to CP/M* originally appeared in MICROSYSTEMS between

January 1980 and February 1982. Except for this collection, these articles are now unavailable! *Programmer's Guide to CP/M* gives you an in-depth look at CP/M from the viewpoint of the programmer—the individual who creates the software that interfaces directly with CP/M, or who is installing CP/M on systems for which configurations do not already exist.

Contents include "An Introduction to CP/M," "The CP/M Connection," "CP/M Software Reviews," "CP/M Utilities & Enhancement," "CP/M 86" and "CP/M Software Directories." 200 pages, \$12.95.

Microsystems

MICROSYSTEMS PRESS

Dept. WDH, 39 East Hanover Avenue
Morris Plains, NJ 07950

Send me _____ copies of *Programmer's Guide to CP/M* at \$12.95 each, plus \$2 for postage and handling, \$14C.

☐ Outside USA add \$3.00 per order.

☐ PAYMENT ENCLOSED \$_____ CA, NJ and NY State residents add applicable sales tax.

☐ CHARGE MY: ☐ American Express ☐ MasterCard ☐ Visa

Card No. _____ Exp. Date _____

Signature _____

Print Name _____

Address _____ Apt. _____

City _____ State _____ Zip _____

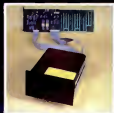
For faster service, CALL TOLL FREE: 800-631-8112
(In NJ only, call 201-540-0445)

THE RACE FOR SPACE

Maynard's In the lead with an expanding universe of space-saving systems for your PC!

Modular disk drive systems by Maynard Electronics drive technology to the limit to deliver unmatched performance with PC-DOS compatibility including self-booting off the hard disk.

10MB Winchester Internal Hard Disk Drive System!



This dynamic system lets you upgrade your PC or compatible to XT effectiveness, is internally installed, and does not require an additional power supply! The 10MB Hard Disk Drive System is equipped with the SandStar (TM) Hard Disk Controller Card which can accept up to three additional modular functions. Or, configure your system with the Hard Disk Controller Module and the SandStar Floppy Drive Controller Card which runs 5 1/4" and 8" Floppy Drives while still leaving four expansion slots for additional boards! Or, if you prefer, arrange your system with the Hard Disk Controller Module and the SandStar (TM) Memory Card which lets you add from 64K to 576K of memory using only one card slot!

Maynard's SandStar (TM) Cards and Modules can put you lightyears ahead...

With technology racing into the future, serious computer users need to set their sights beyond obsolescence. Through the use of versatile SandStar (TM) Cards and Modules, Maynard has been able to engineer hardware to keep pace with tomorrow's needs. With Maynard's Disk Drive Systems and SandStar (TM) Cards and Modules, you won't be left behind in the race for space. For more details, call your dealer or distributor today.

NEW! "The Apollo" 30MB Internal Hard Disk Drive.

This powerhouse comes with 30MB of on-line storage using PC DOS without any special software drivers. Discover new worlds of data efficiency and versatility. Our 30MB system includes the Hard Disk Controller Card or any of the other SandStar (TM) Cards with Hard Disk Controller Module.



NEW! "The Gemini" Hard and Floppy Drive System.



Now, for the first time, add the Gemini to your one drive system and take full advantage of internal Hard Disk power along with two internal Floppy Drive units. The Gemini comes with a sleek 10MB Half-Height Hard Disk Drive, a Half-Height Floppy Disk Drive (DS/DD), the

SandStar (TM) Floppy Drive Controller Card with the Hard Disk Controller Module. Boost memory capacity dramatically while using no more space than a standard floppy drive! The Gemini can also be configured with either the SandStar (TM) Hard Disk Controller Card or the SandStar (TM) Memory Card with the Hard Disk Controller Module.



MAYNARD ELECTRONICS

430 E. Semoran Blvd.
Casselberry, Florida 32707
305/331-6402

We make modem times better.

* Serial Port, Parallel Port, Hard Disk Controller, Clock
Calendar, Game Adapter, and Prototyping Modules are
available.

CIRCLE 437 ON READER SERVICE CARD

"Excuse Me,



Make Way For Hayes' Please.

An advanced, easy-to-use data management system for the IBM® PC and compatibles.

Want to get your paperwork out of a clumsy file cabinet and onto your PC's screen, where you can manage it better? Frustrated with data base software that's either too limited or too difficult to use? Hayes offers you a simple word of kindness.

Please.™ A powerful, yet easy-to-use, system for organizing and managing your information. *Please* is flexible enough to store any data you enter, and it'll return data to you in exactly the form you need. *Please* does more.

It does it all faster. And it's sure to please!

"The menu, Please?"

Menus list all your options and tell you exactly which keys to press for every *Please* feature.

That's to be expected. As the telecomputing leader, Hayes built its reputation on quality design, reliability

and customer support. Now these same standards have been applied to a new data management system that is going to instantly change the way you do business!

Say you're looking for an efficient way to maintain sales data. *Please* leads you every step of the way in creating a sales database that might include names, addresses, dates and figures. These categories are called "fields" in database lingo, and they're the very heart of your database structure.

Want last month's total in a particular region? Press a few keys and it's yours! A few more keystrokes and you'll know who's moving product, and what's your biggest seller.

Please will supply you with labels for a mailing to selected customers. It can send customer information to your word processor for a promotional letter. And it can receive data from

your spreadsheet program. *Please* will even look up a name and company for you, your Hayes Smartmodem* will dial the phone number, and you're ready to talk!

Taking this same sales database, you might also want to define special

"Make it snappy, Please!"

Need a report fast? You and *Please* can put together a Quick List in a matter of seconds.

fields for a custom Output Plan. With a defined field for "COMMISSIONS DUE," *Please* can automa-

tically compute each salesman's commissions, and print them out in a report of your own design. All this and more, just for saying "Please."

And if you ever change your mind and want to change the structure of your database, please feel free. Step-by-step instructions show you how.

You have the same flexibility with any database you and *Please* design. You can store up to 16 million records and 200 custom Output Plans for each database! More than you're likely ever to require. But isn't it nice

Please."



"Put it here, Please."

Design a special screen format to position data in a particular place.

Just in case you ever need it?

Now you might think that a data management system that does all this must be difficult to use. Right? Rest assured. *Please* works hard so you don't have to. An easy-to-follow sample disk shows you everything you need to know to create your first database. Three *Please* menus show you which keys to press to access every feature. And whenever you need it, *Please* provides on-screen HELP messages, tailored to a specific task. So you needn't waste time reading through a list of unrelated instructions on your screen. Or stop what you're doing to consult a manual. In no time at all, and with no assistance at all, you'll be a *Please* database pro!

knowing all that storage power is there?

"Merge these, Please!"

Combine data from one database into another, without changing your original.

Everything about *Please* is designed to save you time and effort. So what could make data management even easier? *Please Application Templates*, that's what!

To help you get up-and-running immediately, we've developed a series of practical, pre-designed templates. You'll appreciate their well-thought-out structure, and "fill-in-the-blank" ease. Choose several! For business and personal use.

Including *Mailing List*, for storing names and addresses and producing mailing lists. *Contacts*, for man-

aging facts and figures about your sales contacts. *Applicants*, for following applicants throughout the interviewing process. *Appointments*, for maintaining your calendar and tracking all of your business expenses. *Household Records*, a complete home management system. And more! Your dealer has details!

Buy *Please* now! Get a FREE Mailing List template from your dealer.

Second FREE template of your choice, direct from Hayes!

Help yourself. *Please!* And take advantage of these two valuable offers. See your dealer right away!



Hayes

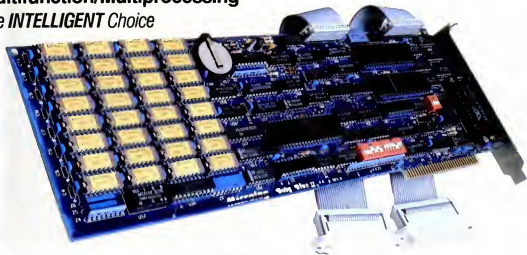
Hayes Microcomputer Products, Inc.,
5923 Peachtree Industrial Blvd.,
Norcross, Georgia 30092. 404/441-1617.

CIRCLE 163 ON READER SERVICE CARD

BabyBlue II

Multifunction/Multiprocessing

The INTELLIGENT Choice



Packed with ALL the popular features:

- Up to a 256 KiloByte Memory Expansion, optional in 64K blocks.
- Clock/Calendar with long-life battery back-up (choose replaceable or optional rechargeable battery).
- Parallel Port for use with IBM/Epson and most other parallel printers (addressable as LPT1: or LPT2).
- Two (2) Serial Ports addressable as COM1: and COM2: . OR use our unique extended port addressing to configure for serial devices other than COM1: and COM2: (i.e. pointing devices, graphics tablets, etc.).
- Baby Blue II is fully compatible with the IBM PC, the PC/XT and other compatibles, including the Texas Instruments Professional Computer.

Not just another DUMB multi-function board.

With all that hardware to manage, we think a board should have a brain. You won't find this feature on other boards—they may look pretty, but they can be pretty boring once you get them home. Baby Blue II is actually a second computer inside your PC, built around the high-speed Z-80B microprocessor.

• Background Processing:

Compile, assemble, sort, calculate, communicate or print—all in the background, while you and your PC continue to work on other tasks in the foreground. Because it is a separate computer, Baby Blue II performs these functions without slowing down your PC, helping you to do more work in less time.

• Autostart at Preset Time:

Baby Blue II can begin any task, even a background operation, at a specific time by consulting the on-board real-time clock.

• CP/M Capability:

Baby Blue II offers instant access to the vast CP/M-80 library of mature, professional software for every conceivable application.

• Dual Ported Memory and I/O:

You can use Baby Blue II's memory, ports and clock as ordinary enhancements to your PC. Or, you can let our Z-80 micro-processor control the board directly, for truly independent back-ground operation.

All this and SOFTWARE too . . .

Systems utilities

PDO RAMdisk Software: create a FAST pseudo-disk drive of any size in available system RAM. The DOS 2.0 version lets you change the size of your RAMdisk from the keyboard.

Print Buffer/Spooler: a TRUE print spooler: the Z-80 buffers and manages printing independent of your PC. Unlike other so-called "spoolers", this one won't stop your printer or slow you down when you start another job.

Clock Software: sets Baby Blue II's clock and initializes the system clock at boot time—never type the time and date again!

Communications

Smart Terminal Emulator Package (STEP): talk to other microcomputers or connect to larger host computers, as an asynchronous terminal through Baby Blue II's serial ports. Unlike other "smart terminal" programs, STEP offers full emulation of popular video display terminals (the standard package includes TeleVideo 950 and Hazeltine 1500).

IBM 3101, DEC VT100 and many others are optionally available). You can send or receive text files, and with STEP's unique Sessions Menu, changing your configuration is a keystroke away.

BTAM File Transfer Utility: Transmit and Receive text, HEX, and binary files (including .COM files) without errors and without fuss. BTAM is easy to use, with all configuration parameters handled transparently under STEP.

CP/M-80 compatibility

Baby Blue Conversion Software: Microlog's famous CP/M Emulator turns CP/M-80 programs into PC-DOS programs for fast, efficient execution on Baby Blue II. Completely transparent operation using standard PC-DOS commands—freely mix PC-DOS with CP/M programs and text/data files on the same PC-DOS disks.

Convert: supports bidirectional file transfer between PC-DOS and popular CP/M disk formats.

Keylix: automates your keyboard with 54 programmable function keys for CP/M programs, eliminating tedious typing chores (max. 80 characters per key).

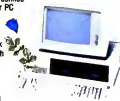
Baby Blue II (64K installed) \$ 695.

QUALITY you can count on . . .

Microlog is in the business of producing high quality, intelligent computer peripherals. Extensive factory testing gives our products one of the highest reliability rates in the industry. The finest components, connectors, and multi-layer PC board design,

ensure years of trouble-free operation. We back all our products with a 90 day warranty and full technical support.

For more information on Baby Blue II and other fine Microlog products, see your micro-computer dealer or contact us:



Microlog™
A TU INTERNATIONAL COMPANY

Microlog, Inc.
222 Rte. 59
Suffern, NY 10901
(914) 368-0353

CIRCLE 316 ON READER SERVICE CARD

Baby Blue II is a trademark of Microlog, Inc.
CP/M is a registered trademark of Digital Research, Inc.
BTAM is a trademark of Dyrum Software, Inc.
IBM is a trademark of International Business Machines Corporation.
©1983 Microlog, Inc.

Micros and Microbes

MICROBE's flexible and easy-to-use search modules can handle the sorts of data-retrieval problems that occur most frequently in running a hospital's microbiology laboratory.

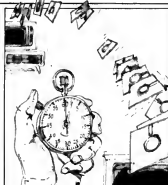
Microbiology departments have been among the last hospital laboratories to feel the influence of computers, largely because of the costs involved. In my last column, I described MICROBE, an eight-module program I wrote to automate the microbiology laboratory at the University of New Mexico Hospital/Bernalillo County Medical Center. The laboratory staff used this program to build a database. The system is an economical substitute for a dedicated hospital laboratory computer.

Three primary data retrieval needs recur in the microbiology lab: listing the outstanding cultures that have not yet been completed; answering telephone inquiries on recent culture results; and searching through the database for answers to epidemiologic questions. They require three different modules.

List Generation

The worklist generation module provides the laboratory technologist with a list of each culture for which a result has not yet been entered into the database. This ensures against lost cultures, and it also guarantees that results for each culture are entered as soon as they become available.

Selecting the generation module from the main menu automatically initiates a scan of the recently received specimens. The program separates the data on the



basis of workstation by examining the alphabetic prefix in the accession number that identifies each culture. The lists that are output to the printer contain the patient's name and hospital number, the date of receipt, and the decoded anatomic source of the culture. Each worklist also contains a header identifying the workstation and the date printed.

In any hospital laboratory, there is a lag between the time results are known and the time they appear on the chart. Consequently, telephone inquiries concerning the most recent results are a frequent occurrence, particularly in microbiology where the time of availability of the results is uncertain, owing to the whims of the growing organisms. MICROBE's quick-search module is designed to shorten the

time required to answer telephone inquiries. An input template (shown in Figure 1) is used to select the search criteria. You must fill in either the Patient Name or Hospital Number field before beginning, or the program will display an error message and move the cursor to the name field.

The extent of the search depends on the date you enter on the search screen. If both date fields are blank, the search begins on January 1, 1983, and proceeds to the present. This can take quite some time as the database becomes larger. If you do specify a date, the program examines the date-directory files. The first logical record number for that date is selected; the search begins there and extends to the present. You may restrict the search to a particular type of test by entering the alphabetic prefix of that test in the appropriate field.

As the program locates records satisfying all of the search criteria, it displays them on the screen. When the program has located the records, it displays them in pages of 20 records each. You may review other pages by using the PgUp and PgDn keys. When the record of interest is on the screen, you can decode the entry by positioning the cursor at the beginning of that line and then pressing F3. The screen is cleared, and the record is displayed on line 1. The decoded entry appears below, including the date received; the source; the

FAST LETTER QUALITY FOR YOUR EPSON

Now you can print **letter quality** on your Epson FX printer at **full text-mode speed**, up to 10 times faster than with programs using graphics mode. **Printer Boss™** software gives you **two-pass dot-matrix letter quality** and lets you create a **printer buffer** of up to 32K. Or print multi-page **spreadsheets** as wide as you like, **sideways** on your paper, at high speed, in a choice of five different type sizes.

Printer Boss™ also allows full menu-based operation of all control functions of all of the Epson MX, FX and RX printers. **Select** and **deselect** pica, elite, compressed, italic, enlarged, emphasized, doublestrike, underline, superscript and subscript for scores of different faces. **Set** line spacing, right and left margins and skip-over-perforation. **Load** USA, France, Germany, England, Denmark, Sweden, Italy, Spain and Japan language sets. **Control** unidirectional, half-speed and proportionally-spaced printing. **Store** and **retrieve** 10 complete menu settings with a few keystrokes. **Emulate** the IBM-label printer for the IBM-PC while retaining full printer versatility. **Download** to FX printers five different **IBM character sets**, including graphics symbols, greek symbols, screen and APL characters. Print at full text-mode speed. **Ideal for IBM graphics** software, or **screen dumps**, or printing text from **Wordstar**, **Lotus 123** or many other fine programs.

Printer Boss™ for the IBM-PC and compatibles \$59.95. With Letter Boss™ letter quality or Sidekick™ sideways print option \$99.95. With both \$139.95. Visa, MC, or send check. Free info. Dealers welcome.

Printer Boss™

CONNECTICUT SOFTWARE
30 WILSON AVENUE
ROWAYTON CT 06853
203-838-1844

SIDEKICK IS NOT TO BE CONFUSED WITH SIDEWAYS. A TRADEMARK OF JUNK SOFTWARE. PRINTER BOSS, LETTER BOSS AND SIDEKICK ARE TRADEMARKS OF SPEER RESEARCH CORPORATION. WORDSTAR AND LOTUS 123 ARE TRADEMARKS OF MICROPRO INT'L CORP AND LOTUS DEVELOPMENT CORP RESPECTIVELY.

SCIENCE

```

Name: .....
Hospital Number: .....
Date In: .....
Date Out: .....
Test Code: .

A = Aerobio      F = Faegus      R = Roatine      V = Virue
B = Blood        H = Antigen  S = Strap Only
D = Direct Exam  P = Parasite  T = TS

F1 Main Menu  F3 Decode  F4 Display Hits  F9 New Search  F10 Search
  
```

Figure 1: An input template to select search criteria in MICROBE.

organism; and a list of the antibiotics to which the organism was sensitive, partially sensitive, and resistant. If no organism code is present, the entry is labeled "Results Pending."

Most Flexible Module

Printed output cannot be made from this module (except with the PrtSc key), nor can ranges of dates or organisms be searched. If you need any of these, use the extended-search module. This module lets you search the database by any combination of patient name/hospital number, ward, dates, source codes, organism codes, test type, or epidemiologically significant organisms. The selected records may be displayed to the screen or printed. If printed, the records may be decoded or not, and may be sorted into alphabetical order by patient name. One or more of the first 12 fields must contain a target before the program will begin the search. After you have entered all the parameters, you can begin the search by pressing F10.

The date fields in this module differ slightly from those in the quick-search module. If you do not specify a date, the

search will still begin on January 1, 1983, and proceed through the end of the database. If you specify an initial date, only records matching the date will be retrieved. For a range of dates, all records between the two dates are retrieved.

If you direct the output to the screen, the search proceeds exactly like a quick search. If you direct the output to the printer, the program stores all results until the end of the search and sorts them if needed. MICROBE does a quick sort using the patient's name as the sort key. In a compiled program, a 450-name list can be sorted in slightly over 1 second with no noticeable delay between the end of the search and the beginning of the printing. A sample of a decoded, printed output is shown in Figure 2.

The extended search module can answer questions such as these:

- Late in the course of a complicated hospitalization, the Infectious Disease consultant is asked to see a patient. What cultures have been received on this patient since admission, and which were positive?
- How many *Staphylococcus aureus* wound infections have occurred this

```

ANDERSON ROBERT S  123456  RR  B291 483711 403819 72 5 155 010 200 200 101

Source: Urine, unspecified collection      Received: 2/7/1984
Organism: Escherichia coli                Quantity: >= 1005
Sensitive to: Cephalosporin Nitrofurantoin
Interpretation to:
Resistant to: Amp Tetra Trimethoprim
  
```

Figure 2: Decoded output from an extended search.

IBM PC & XT

IBM PC & XT Computers

IBM WORD PROCESSING PACKAGES

- IBM PC/XT with keyboard
- IBM Display with cable
- IBM Monochrome display
- IBM Display with cable
- IBM LaserJet printer
- IBM LaserJet printer
- IBM LaserJet printer
- IBM LaserJet printer

Call 1-800-4-A-IBM for more information

IBM PC/XT with keyboard \$2,799

IBM Display with cable \$299

IBM Monochrome display \$299

IBM Display with cable \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

AST Multi-Function

IBM PC and XT

IBM PC and XT Computers

- IBM PC/XT with keyboard
- IBM Display with cable
- IBM Monochrome display
- IBM Display with cable
- IBM LaserJet printer
- IBM LaserJet printer
- IBM LaserJet printer
- IBM LaserJet printer

Call 1-800-4-A-IBM for more information

IBM PC/XT with keyboard \$2,799

IBM Display with cable \$299

IBM Monochrome display \$299

IBM Display with cable \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

EPSON

IBM PC and XT

IBM PC and XT Computers

- IBM PC/XT with keyboard
- IBM Display with cable
- IBM Monochrome display
- IBM Display with cable
- IBM LaserJet printer
- IBM LaserJet printer
- IBM LaserJet printer
- IBM LaserJet printer

Call 1-800-4-A-IBM for more information

IBM PC/XT with keyboard \$2,799

IBM Display with cable \$299

IBM Monochrome display \$299

IBM Display with cable \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

IBM LaserJet printer \$299

month in the surgery intensive care unit? Is this more or less than the number that occurred 3 months ago?

- Has a particular patient had any other positive blood cultures with the same organism in the last 6 months during his three hospital admissions?
- How many admissions have there been for pediatric meningitis this year, and what are the organisms?

Purging Negative Results

After a short time, usually a few days, there is little use for the negative results. These can be purged from the database and archived to floppy disks using MICROBE's purge module. Decreasing the size of the database in this way speeds up search process. In addition, backing up the file takes less time; the backup may fit on another floppy disk. In our lab, a back-up is made only once every other week. When the program purges the negative results, it generates an alphabetized list of the cultures for easy reference.

Several companion programs utilize MICROBE's database. Probably the most clinically useful of these calculates cumulative antibiotic sensitivities of organisms over a given period of time. The program stops at separating the sources into urinary and nonurinary groups, but further subdivisions are clearly possible. Sensitivity statistics compiled over several months allow the detection of changing trends in antibiotic susceptibilities. Most importantly, these statistics provide clinicians with current, local guidelines for immediate presumptive treatment of infections before specific antibiotic susceptibilities are determined.

I am currently developing other enhancements to MICROBE in collaboration with the head of the microbiology department, including capture of College of American Pathologists workload statistics. The present system however, demonstrates that successful, competitive, inexpensive alternatives for hospital laboratory information management are now possible and available.

COMPAQ

COMPAQ COMPUTERS

COMPAQ 128K, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz

Compaq 128K, 1.1 MHz, 1.1 MHz, 1.1 MHz



What if . . . your software gets too soft?

You need software insurance.

Diskettes are fragile, and when a protected program is damaged, the results are expensive and inconvenient. If you have a backup diskette, though, you can have your Apple, IBM or compatible computer back on line within seconds...affordably. That's software insurance.

Copy II Plus (Apple II, II Plus, IIe)

This is the most widely used backup program for the Apple. Rated as "one of the best software buys of the year" by InCider magazine, its easy menu puts nearly every disk command at your fingertips. The manual, with more than 700 illustrations, shows protection schemes and full backup and restore. It's simple instructions for backing up over 300 popular programs. A new version is now available that is easier to use and more powerful than before. Best of all, Copy II Plus is still only \$39.95.

WildCard 2 (Apple II, II Plus, IIe)

Designed by us and produced by Eastside Software, WildCard 2 is the easiest-to-use, most reliable card available. Making backups of your total load software can be as easy as pressing the button, inserting a blank disk and hitting the return key twice. WildCard 2 copies 48K, 64K and 128K software, and, unlike other cards, is always ready to go. No preloading software into the card or special, preformatted diskettes are required. Your backups can be run with or without the card in place and can be transferred to hard disks. \$139.95 complete.

Important Notice: These products are provided for the purpose of enabling you to make archival copies only. Under the Copyright Law, you, as the owner of a computer program, are entitled to make a new copy for archival purposes only and these products will enable you to do so.

These products are supplied for no other purpose and you are not permitted to utilize them for any use, other than that specified.

Copy II PC (IBM)

This is THE disk backup program for the IBM PC and PC/XT that backs up almost anything. Others may make similar claims, but in reality, nothing out performs Copy II PC...at any price. Copy II PC even includes a disk speed check and is another "best buy" at only \$39.95.

We are the backup professionals. Instead of diluting our efforts in creating a wide variety of programs, we specialize in offering the very best in backup products. So, protect your software investment, before things get too hot.



CENTRAL POINT
Software, Inc.
The Backup Professionals

To order, call 503/244-5782, 8:00-5:30 Mon.-Fri., or send your order to: Central Point Software, 9700 SW Capitol Hwy, Suite 100, Portland, OR 97219. Prepayment is required. Please include \$3 for shipping and handling (\$8 outside U.S. or Canada).

Keeping Up With the IRS: PC Taxmasters

The investment you make in software for long-term tax planning and tax-form preparation may tip the scales in your favor and bring you a favorable return from the IRS next April.

Thousands of Americans play the great shell game on their 1040 forms every April. As tax brackets creep upward, salary increases and investment profits vaporize: "Now you see them, now you don't." But the fact is that most taxpayers don't take advantage of all the deductions to which they're entitled under the law.

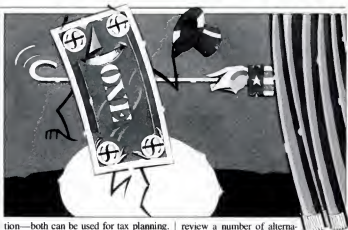
The real measure of your earnings or investment profits is how much you get to keep after taxes are paid. All sorts of tax shelters are available to reduce your yearly tax burden—they range from such exotic interests as cattle investing or box-car leasing to an old standby like real estate.

Personal computer tax programs can help you avoid too many taxes, stay within the intent of the law, and minimize your chances of being audited.

Two Types of Programs

A variety of excellent software is available for federal tax planning purposes and for the preparation of returns. When you select one, be sure that the supplier can provide yearly updates—changes in tax law that could tip the scales in your favor must be included in the program. Usually these updates are worth the additional cost (often about \$50).

Although there are two distinct types of tax programs—planning and prepara-



tion—both can be used for tax planning. The essential difference is that tax planning programs let you view up to 4 consecutive years for comparison purposes. Preparation programs, on the other hand, let you store deductions for the current year, line by line in the forms that make up your return. Anytime a change in your financial status occurs, you can modify an element, recalculate the Form 1040, and watch the effect on the bottom line.

A tax preparation program is useful for evaluating tax liability changes during the year, but it doesn't help if you want to look at how your tax liability will change for future years. This is where the tax planning programs shine. If you need to

review a number of alternative tax decisions over the long term, tax planning programs are the better choice. On the other hand, a preparation program can give you a detailed outlook on your tax burden for the current year.

Tax Preparation

The *HowardSoft Tax Preparer* program (\$295) from Howard Software Services (La Jolla, California) is representative of numerous tax preparation programs. It was designed for individuals who prepare their own returns as well as for professionals who must handle several hundred returns during the tax season. The standard *Tax Preparer* package allows for

TURN AN IBM PC DOT MATRIX PRINTER INTO A DAISY ...

NicePrint runs on
the PCjr as well!



with *NicePrint*

The standard of printing excellence is the daisy-wheel printer. The *NicePrint* software package improves your IBM, EPSON, or Gemini graphics printer to near daisy-wheel print quality. And possibly best of all, WordStar, 1-2-3 and most other programs will run just as before with the exception that your dot matrix printer now prints like a daisy!

Look at these actual print samples: Here is a sample of dot matrix printing. Change it into a daisy with *NicePrint*!

There are six font styles in this package: Roman, Sans Serif, ORATOR LARGE, Script style, GODE ENGLISH and COMPUTER.

All font styles can be underlined, **boldfaced**, and *italicized* easily. In addition, all fonts can have pica, elite, and four other pitches for maximum versatility.

NicePrint represents the ultimate in user friendliness because you only have to read one page of the manual to get it going!

For your convenience, *NicePrint* is not copy protected.

Contact your local IBM PC dealer for a demonstration. If he doesn't carry it, call or write us:

Spies Laboratories

(pronounced "speek")

P.O. Box 336

Lawndale, CA 90260

(213) 538-8166

Suggested retail price: \$95.00

WordStar is a TM of MicroPro Corp.

1-2-3 is a TM of Lotus Development Corp.

CIRCLE 119 ON READER SERVICE CARD

FINANCE

the completion of 11 forms and 10 schedules. These forms and schedules are prepared directly on the computer display as facsimiles of the actual paper forms you'll send off to the IRS.

Once new data is entered on the appropriate lines, the computer automatically computes and posts results onto other forms and schedules as required. This method allows for fast data entry, error correction, and results preparation. It also makes *Tax Preparer* easy to learn.

For example, you can list specific ele-

When you select a planning program, be sure that the supplier can provide yearly updates to reflect changes in tax laws.

ments of profit or loss from a business or profession on Schedule D as they occur. Investors concerned with tracking their interest and dividend income or capital gains can enter investment return data on computer facsimiles of Schedules B and D, respectively. This makes editing and updating easier. These itemized lists can also be used as supporting statements for the IRS.

Getting It Together

The greatest burden at tax time is collecting all the sales slips, interest notices, mortgage receipts, and the myriad of backup forms you need prior to filling out the tax forms. Tax preparation programs help you make order out of this chaos. They won't keep you from losing your receipts, but they do store the data you need to compute your taxes.

It's a good idea to update your current-year return monthly so you'll have your information in the right place when April 15th rolls around. Even if you hire a CPA

to figure your return, it will work to your advantage to keep records well organized.

Forms and schedules to be printed by the *Tax Preparer* are selected from a menu. They are prepared directly onto either preprinted forms for Form 1040 (as required by the IRS) or a computer-generated format that follows IRS guidelines.

If you're in the tax preparation business, the *Tax Preparer* will maintain an up-to-date list of your clients. You can select the records you want printed, and they will be prepared automatically.

Tax Planning

Two tax programs from Aardvark/McGraw-Hill (Milwaukee, Wisconsin)—the *Personal Tax Planner* (\$99) and the *Professional Tax Planner* (\$350)—allow yearly side-by-side comparisons of the tax effects of one or more situations. The *Personal Tax Planner* is designed for the individual; the *Professional Tax Planner* is a more extensive planning program for tax advisers, CPAs, and other tax professionals. Both programs compare up to 4 years of alternatives, print them for review and analysis, or store them on computer disks so you can make future amendments. Although no forms or schedules are prepared, these planning programs are ideally suited for snapshots of multiple-year tax-related activities.

The personal version permits you to analyze the effect of 48 variables on your taxes. These variables fall into ten categories such as filing status and exemptions, adjustments to income, itemized deductions, income averaging, payments, and various taxes and credits.

Professional Tax Planner allows analysis of up to 109 variables in 15 categories with the more advanced version. Categories such as minimum and alternate minimum tax, 10-year averaging, investment interest expense limitations, and cost-of-living indexing are included in addition to the categories available in *Personal Tax Planner*.

The *Professional Tax Planner* also

INTEGRATED PACKAGES

Open Access	\$446
DayGo	call
Vision	\$90
Framework	***
IUS Windows	\$146

DATABASES

dBase II	\$300
dBase III	***
InfoScope	\$149
Powerbase	\$330
EasyFiler	\$280
Knowledgeman	\$266
R: Base	\$330

Clout

Extended Report Writer	***
Program Interface	***
Infostar Plus	\$330
FPS File	\$99
Satellite Software's Datapath	call

WORD PROCESSING

EasyWriter II System	\$196
WordStar Professional Pack	\$360
Microsoft Word with Mouse	\$310
Multimate	\$296
MultMerge Converts database files to Multimate Merge files	\$76
Volkswriter Deluxe	\$166
WordPerfect	\$266
Thinktank	\$169

SPREADSHEETS

Supercalc 3	\$280
Multiplan	\$169

BUSINESS PACKAGES

IUS (most packages)	\$296
XQ	call
Dow Jones. All packages	call
Real Estate Analyzer	call

We also carry a variety of templates for use with 1-2-3

COMMUNICATIONS

Hayes Smartcom II	\$70
Microsoft Crosstalk XVI	\$109

PROGRAMMING

Due to the large number of requests for programming related products, we have expanded our list of products and manufacturers. Please call for price and availability on the compilers, editors and utilities you need.

GRAPHICS

PC draw	call
Graphics Master	call
CharMaster	\$246
Signmaster	\$286
CharMaster	***

PRINTER UTILITIES

Snapshot: A phenomenal new graphics dump that runs on a variety of computers and supports dozens of printers, now with increased support for Temmar Graphics Master and Quadcolor I and II boards	\$60
Set FX +	\$48
Sideways	\$48

micro STOREHOUSE

333 Peters Street, S.W./Atlanta, Georgia 30313/404-577-8892

TRAINING PACKAGES

We carry a full line of AT1 training packages each \$45

UTILITIES

Norton's Utilities	\$55
Prokey	\$95
Multilink	call

DISKETTES from \$24

DISK DRIVES

Tandon double sided disk drives	\$215
Amdek half height	call
Pegasus hard disk	from \$1190

I squared hard disk drive, streamer tape back up available no extra board needed for streamer tape, controller board has room for clock or ports
Iomega Bernoulli box: ten Mg removable hard disk cartridges which run at amazing speed. Single or double available

BOARDS

Ask about all the big selling brand names.

Quadram 384	from \$265
Quadlink	\$489
Quadcolor I color board	\$205
Quadcolor II expansion	\$236
Persysat a multifunction board at exceedingly good prices	call

Temmar:

Graphics Master	\$485
Captain board including Treasure Chest of Software	from \$245
Color boards with parallel port	call

Amdek M41 board (color, monochrome, half graphics software)	\$375
Hercules	\$350
Graphic x software	\$42

NETWORKING/PROTOCOL CONVERSION

We carry Irma boards, and a variety of networking alternatives. Call for information.

SURGE PROTECTORS

Networkx (UL listed)	
4 plug w/fuse	\$65
6 plug w/modem noise protection	\$99
1 plug	\$30

EFD Lemons, Limes, Oranges call

ACCESSORIES

Kraft Joysticks	\$39
Kraft Game Paddles	\$29
Kaslo Pad	\$99
Microsoft mouse	call
Quadram Microfaser printer buffer	from \$189

MONITORS

Amdek 300	\$130
Amdek 300A	\$140
Amdek 310A	\$180
Amdek Color IV	\$605
We will carry the newest Amdek monitors: Zenith ZVM 133	\$499
Princeton Max12	***
Quadram Quadchrome monitor	\$495

MODEMS

Hayes 1200	\$465
Hayes 1200 B internal	\$419
Novation Access 1, 2, 3	\$425
Hayes 300	\$199

PRINTERS

Canon Ink Jet Printer. Includes graphics screen dump program, our exclusive \$899

Epson. All models including new LQ1500	call
Okidata. We stock 92, 93 and 94	
C. Roh	call
Diablo 630 API	\$1875
Diablo 630 ECS	call
NEC 3590	call

We carry a full line of out sheet feeders and tractor feeders for all of our letter quality printers. Ask for prices.

NEXT MONTH We are celebrating our first birthday. We at Micro Storehouse are proud of the reputation we have built. Our goal is to be able to provide high quality equipment at competitive prices. Our large inventory affords fast service for our customers.

We are finally up and running on a computerized inventory system. We will be able to tell you almost immediately if an item is in stock or not. Be patient with us on those rare occasions we are out of stock. The market in the computer business changes so quickly that often manufacturers can't keep up with the demand. Sometimes, a magazine review causes unusual demand. Either way, if we can't fill your order, rest assured that we will send your merchandise as fast as possible.

SHIPPING You will be charged the exact cost of shipping plus \$1.50.

CREDIT CARDS We accept Visa, MasterCard and American Express. No extra charge for credit cards.

CORPORATE AND LARGE QUANTITY ORDERS need special attention. Ask for a Corporate Account Representative. He or she will follow your order through the shipping and billing process to assure your satisfaction.

***Price not available at press time.

For orders, call toll free:

1-800-554-7661

For information and compatibility questions, call 404-577-8892 and ask for our user friendly sales staff. Prices subject to change without notice.

FINANCE

generates five reports that are useful for analyzing a complex tax situation. The Investment Report shows the after-tax effects of investments that your clients

may be considering. The Federal Income Tax Summary is similar to the first two pages of the Form 1040 and includes Schedule A deductions and carryovers.

The Other Income/Credits report generates a detailed account of income and losses included within adjusted gross income, and credits calculated to offset the regular tax liability on the Federal Income Tax Summary. In addition, *Professional Tax Planner* generates Income Averaging and Alternative Minimum Tax reports.

Both programs use two tax planning types—the alternative mode and the projection mode. The alternative mode analyzes up to five different tax situations for a single tax year. Each alternative is calculated independently, and the calculations and tax results of one alternative do not affect the results of the other alternatives. You can examine the tax consequences of financial decisions by varying one or more tax items from one alternative to the next.

The projection mode, on the other hand, analyzes a tax situation for an initial year, called the base year, and up to 4 succeeding years. Calculations and taxes in the early years, such as carryovers from capital losses and charitable contributions, are used in calculations for later years. Income averaging information is adjusted from year to year.

Long-term tax planning is made possible with the yearly side-by-side comparison provided by both the *Personal Tax Planner* and *Professional Tax Planner*. The real worth of your financial activities can be quickly measured against their effect on your tax burden, and you can then decide which of several alternative actions will provide the greatest benefit.

Strategic Planning

The objective of strategic tax planning is to thoroughly analyze your current and future tax liabilities. This knowledge should help you make better financial decisions both in your business and investment activities.

Your personal computer, along with tax preparation and planning software, can play a key role in your efforts to keep the amount of taxes you pay each year under control.

IT PAYS TO CALL PC WAREHOUSE!

404/432-5555

404/432-5555

404/432-5555

FLOPPY DISK DRIVES (*IBM PC compatible)

Tandon TM100-2 (DS/DD)
1/2 height DS/DD

\$205.00
\$189.00

64K RAM
CHIP SETS:
\$49.00

MONITORS

Amdel 310A
Princeton Graphics System HK12
Quadram Quadchrome

\$175.00
\$470.00
\$479.00

\$18.00
\$8.00
\$130.00

PRINTERS

Okidata B2
Okidata B3
Okidata B4
Okidata B2
Okidata B3

\$348.00
\$598.00
\$668.00
\$459.00
Best Price!

\$289.00
\$389.00
Cell
Cell
\$599.00

MONITOR INTERFACE CARDS

Plantronics Color +
PC Pincock
ISI Multi-
Display
 Hercules Hi-Res.
Graphics

\$399.00
\$299.00
\$89.00
Best Price!
\$359.00

MULTI-FUNCTION BOARDS

AST 6 Pak Plus
(with 64K)
AST Megapack II
(with 64K)
AST Gamaport
Tosmar Captain
Tosmar First Mate

\$279.00
\$284.00
\$35.00
\$285.00
\$295.00

MODEMS

Hayes SmartModem
1200
Hayes SmartModem
1200S
Hayes SmartModem
300
Rixxon 2400 bits
per second

\$489.00
\$449.00
\$309.00
\$849.00

SOFTWARE

Lotus 1-2-3
dBase II
Wordstar
Hayes SmartCom II
Crosstalk
Multimate

\$329.00
\$389.00
\$259.00
\$89.00
\$109.00
\$335.00

PC
Warehouse

P.O. BOX 72394
ATLANTA, GA. 30339
404/432-5555

MASTER CHARGE & VISA ACCEPTED
CIRCLE 499 ON READER SERVICE CARD
*IBM IS A REGISTERED TRADEMARK OF IBM CORPORATION

MICROMAIL™

THE PC SYSTEM SPECIALIST

PRICES AND AVAILABILITY SUBJECT TO CHANGE WITHOUT NOTICE



SPECIAL OF THE MONTH



TAVA PC™

A Superior quality IBM PC Compatible Personal Computer. Runs DOS 1.1, 2.0, 2.1, CP/M86®, UCSD p-System®, Runs Lotus 1-2-3®, Multi-plan®, WordStar®, PFS®, dBASE® and many more! Hardware includes 128K CPU, Floppy Controller, Two DS/DD Disk Drives, Video Monitor, Video Adapter, Parallel & Serial Ports.



IBM.
PERSONAL
COMPUTER

Special
of the
Month

IBM PC™ COMPLETE LINE

COMPLETE SYSTEM VERY SPECIAL PRICE

64K Two Disk Drives, Floppy Disk Controller, Video Card and High Res Monitor **\$2399**

256K RAM, 360KB Disk Drive, FDC, Video Monitor & Adaptor 10MB Hard Disk Sub-System **\$3990**

CALL FOR LOW PRICE

Suggested List \$2395.00

FREE Lotus 123
or Gemini 10X
with TAVA purchase

PRINTERS

OKIDATA 82	120 cps	CALL
OKIDATA 92	160 cps	CALL
OKIDATA 93	160 cps	CALL
OKIDATA 84	200 cps	CALL
EPSON FX 80	160 cps	\$499
EPSON FX 100-160 cps		CALL
NEC 3550		\$1899
DYNAX DX-15	13 cps	\$450
BROTHER HR-1	16 cps	\$599
BROTHER HR-25	23 cps	\$749
GEMINI 10 X	120 cps	CALL
GEMINI 15 X	120 cps	CALL

DISK DRIVES

SLIM LINE QUMETRAC 142	\$199
TOSHIBA	\$205
PANASONIC	\$199
FULL SIZE TANDOM TM 100-2	\$199

PERIPHERAL CARDS

AST SIXPACK PLUS 64K	\$299
MEGA PLUS 64K	\$299
I/O PLUS-1s 1p.c	\$190

PERIPHERAL CARDS

GAME/SERIAL/PAR	\$39
64K MEMORY	\$50
MONOGRAPHIC	CALL
HERCULES GRAPHICS CARD	\$369
PLANTRONICS COLOR PLUS	\$439
QUADRAM COLOR I/II	CALL
PARADISE MULTI-DISPLAY	\$489

MONITORS

AMDEK 300 G	\$149
300 A	\$159
310 A	\$169
PRINCETON HX-12	\$490
SR-12	CALL
MAX-12A	CALL
ROLAND MB-122 G	\$139
MB-122 A	\$149

MODEMS

HAYES 1200B	CALL
1200	CALL
300	CALL

MICROMAIL

631 E. First St., Tustin, CA 92680

(714) 838-9100

*IBM PC is a registered trademark of IBM Corp.
*dBASE II is a registered trademark of Ashton-Tate, Inc.
*LOTUS 123 is a registered trademark of Lotus Development
*Wordstar, *PFS, *Multiplan are registered trademarks of Micropro International
*Tava is a registered trademark of Tava Corp.

*Multiplan is a registered trademark of Microsoft Corp.
*PFS is a registered trademark of Software Publishing Co.
*CP/M86 is a registered trademark of Digital Research, Inc.
*DOS is a registered trademark of Microsoft Corp.
*UCSD is a registered trademark of Systems Management

SAVE OVER \$1500 ON YOUR NEXT IBM PC.

AND YOUR NEXT. AND YOUR NEXT. AND YOUR NEXT.



Until now, adding extra users to your office system has presented some real problems. Additional PCs are costly. And the problems get tougher when you need shared data access and communication between PCs. Alloy's revolutionary PC-PLUS solves these problems. For \$1195 for each user processor and the addition of a dumb terminal, PC-PLUS transforms your IBM PC into a powerful multi-user, multi-processor system.

In any system requiring more than one PC, PC-PLUS provides a more powerful and less expensive alternative. PC-PLUS is almost twice as fast as an IBM PC. And PC-PLUS is ten times faster than LANs (Local Area Networks) at

half the cost. It also eliminates the cost of LAN controllers, taps, and expensive cabling.

So whether you're adding your secretary or 15 colleagues, Alloy's PC-PLUS can do it at a much lower cost and with higher performance. Best of all, it's available right now. See PC-PLUS in action at Computeland®, Businessland, and at your local dealer. Or call Alloy today at 1617 875-6100.



ALLOY
Computer Products, Inc.

THE BYTE COMPUTER SHOW
San Francisco, Sept. 6-9 **BOOTH 928**

Alloy Computer Products, Inc., 100 Pennsylvania Ave., Framingham, Massachusetts 01701. 1617 875-6100, TWX: 710-346-0394
In Europe: Alloy Computer Products (Europe) Ltd., Cirencester, Gloucestershire, England. Tel: 0285-68709, Tlx: 43340

Insuring Against the Perils of PC

Last issue, the business column brought you a look at micro insurance from a layman's point of view. This issue, PC examines the subject of insurance from a legal perspective.

Now that you've taken the plunge and invested in a microcomputer, it's time to make sure that you have proper insurance coverage. Every owner will want to insure against computer and software damage, and depending upon how you use your micro, you may also need special liability coverage. Choosing among the several forms of special insurance available for your PC can involve all sorts of problems and pitfalls. A brief rundown of your options and opportunities should help make your micro more secure.

Property Insurance

Property insurance (often called "first party" insurance) covers the direct physical losses resulting from fire, flood, and other physical perils. Most common homeowner's policies will cover a personal computer unless it is used primarily for business purposes. If you do use your PC for business, you must look to the specialized market for computer insurance. Also, unlike most standard homeowner's policies, these new computer policies generally cover loss due to power surges.

At least four companies now write special policies just for microcomputers—St. Paul Fire and Marine; Chubb; Shard Morahan & Company; and Safeware. The companies offer essentially identical coverage, but the prices, deductibles, and oth-



er terms will vary. The Hartford also offers similar coverage through an equipment floater endorsement. Most of the new policies are written on a replacement-value basis and will cover all hardware, software, and media.

These new policies usually do not, however, insure data. If you have significant business data storage, you may want to acquire business interruption or "extra expense" insurance to cover the expense of reproducing significant data losses. Some companies provide this coverage through an endorsement or "rider" to their standard policy. The company may also require duplication and separate-site storage for your data—always a good idea.

Be sure to check how your equipment is insured and the proof of loss requirements. For example, some policies require notification of every item of insured equipment *before* a loss occurs. This can be a significant administrative headache for those who often add or exchange peripheral elements. On the other hand, some policies insure all of your equipment up to a certain dollar aggregate without prior notification. You need only present your proof of purchase at the time you make your claim. Of course, you should carefully preserve your purchase documents, preferably in another location.

Make sure you understand what risks are covered under your property policy. Insurers generally offer two basic modes of property risk protection. "Defined risk policies" cover only the specific risks mentioned in the policy. "All-risk" or "blanket" protection policies cover any risk of loss *except* those specifically excluded. Insurers usually charge a lower premium for "defined risk" coverage, but many insureds have learned the hard way that the "defined" risks did not anticipate many common losses.

Although most computer policies are written on an alleged "all risk" basis, the exclusions must be examined carefully. Some policies cover mechanical and electrical breakdowns only if you install specified physical safeguards. If you fail to

BUSINESS

implement these "conditions precedent," you may not be covered.

Many insurance companies are primarily interested in the business market where the risk of liability for harm done to others is a major concern. These business insurers offer comprehensive general liability insurance (CGL), plus errors and omissions (E & O) coverage, a kind of computer malpractice policy.

Liability Insurance

These two kinds of insurance are liability policies (also called "third-party" insurance) because they insure the liability of the insured for damage to third parties. The CGL policy is written for businesses to provide coverage for ordinary lawsuits (for example, someone slips and falls on the premises). Special peril insurance can be added where needed (for example, a

manufacturer will add products liability coverage). The E & O policy is designed to protect professional service concerns such as architects, accountants, and lawyers. People in these professions may have any computer-use liability already covered by their current E & O policy. On the other hand, those providing consultation services for computer usage only may need a computer E & O policy. Review this item with your insurance broker.

Every business needs particular coverage. A retail sales store, for example, probably doesn't need E & O coverage, but every business should probably have CGL coverage. The question becomes whether a firm's current CGL coverage is adequate or whether a special computer-oriented policy is needed.

Traditional CGL policies are often inadequate for data processing users

because the coverage language is keyed to "physical injury to or destruction of tangible property." It may not provide coverage for claims involving "intangible" loss arising from loss of data or injuries due to defective software design. Newer policies address this problem by redefining the coverage.

There are three key questions to be reviewed in any liability policy. First, how is coverage defined? Is it claims-made or occurrence? Traditionally, CGL policies and most E & O policies were written on an "occurrence" basis. This meant that the liability carrier would cover any lawsuit that resulted from an "error" that "occurred" during the policy period (usually 1 year with the possibility of annual renewals). But as the potential liability of manufacturers and others expanded so that they might be held liable today for "er-

SOFTWARE DEVELOPERS

Save thousands of dollars! Save hundreds of hours!

by using our assembly language sub-systems

FABS AUTOSORT

fast B-tree keyed access sub-system high speed Sort/Merge/Select sub-system

- Rapid access and maintenance of large files with fixed-length records
- Versions available for CP/M-80, MP/M-II, CP/M-86, MS-DOS, PC-DOS, Microsoft BASIC(s), COBOL, FORTRAN, PASCAL, PL/I, CBASIC, CB80, CBASIC86, CB86.
- FABS directs all Access, Insert, and Delete file operations
- Key length may be greater than 50 bytes, and six key files open simultaneously
- Multiple primary key and multi-level key plus duplicate and variable-length keys are supported
- Random search time approximately 1 second, sequential step 1/4 sec.
- Deleted records are automatically reclaimed by subsequent insert operations
- Key files never need to be re-sorted: excellent error handling
- Generic search returns the first occurrence of partial key; search-next provides sequential read
- Loads resident with DOS, occupying less than 15k bytes
- Easy to incorporate into existing file-intensive applications
- Extensive commands: Create, Open, Close key file, Search (first, last, next, previous, generic), Insert, Delete, Replace key, Max Length, Open Deletes, # of Records, # of Keys

- Optimized for very large files; stand-alone or callable subroutine; diskettes may be changed during operation
- Versions available for CP/M-80, MP/M-II, CP/M-86 and MS-DOS, PC-DOS running Microsoft BASIC(s), FORTRAN, PASCAL, CBASIC, CB80, CBASIC86, CB86.
- Record size may exceed 5000 bytes, and file length is unlimited
- Sorts based on up to 10 fixed or variable length keys, each ascending/descending
- Key fields may be string, integer, single or double precision numeric
- Output files may consist of full records, key with record pointer, and record pointer only
- Select for retain/delete based on up to 4 keys, AND, OR, >, <, =, conditions
- Single or multi-user; sorted files may be merged
- Fast . . . 4000 records of 128 bytes sorted to give key and pointer file is 170 seconds
- Boot straps itself into end out of memory claiming/restoring memory automatically
- Up to 9 different Sort/Merge/Select Modes of operation; parameters defined at run-time or read from a file
- Interactive parameter set-up program is supplied; files may be on disk drives A-Z

Retail Price \$150 Each + Shipping (OEM Dealer Discounts)
COMPUTER CONTROL SYSTEMS, INC., 298 21st Terrace S.E., Largo, FL (813) 586-1886

BUSINESS

rors" committed years ago, the insurance carriers turned to a new type of policy—the "claims-made" policy. This type of policy insures against claims made against you during the policy period, no matter when the error giving rise to the claim took place. Thus, you can get coverage for any error committed in the past, no matter how long ago it occurred.

The second key question to ask of a liability policy is, what do the exclusions take away? Some risks simply cannot be covered as a matter of law. In Illinois, for example, you cannot insure yourself for punitive damages that are imposed upon you directly. Vicariously imposed punitive damages can be covered. Of course, if there is an exclusion as to punitive damages, you won't have coverage for either. (Punitive damages are meant to punish the defendant for some egregious conduct.

The logic of the law is that it doesn't make sense to allow the insured to pass the judgment buck to an insurance carrier if the intent is to punish the insured.)

The third key question covers the limits of the coverage and the definition of the deductibles. Give serious consideration to these items. Attorney's fees are always high and in a complicated computer loss incident where there is little case law to help guide the court, costs are likely to be very high. Check to see if the deductible applies to defense costs.

Another common coverage problem concerns the application for insurance. Due to the novelty of computer policies, insurance companies are nervous about the risks they are bearing. Accordingly, the applications for these policies are usually lengthy and detailed. But it is absolutely essential to give accurate informa-

tion on these application forms. Any misinformation, even if inadvertent, could be used by the carrier to disclaim liability.

Conclusions

If you have a significant investment in computer equipment, you should make certain that it is adequately covered from all reasonable perils. If you use your computer for business, you may also face third-party liability exposure and you will want to insure against this risk. Careful review of such exposures with your insurance broker is a must. ■

Paul Cottrell and Barry D. Weiss are both attorneys with the Chicago firm of Fohrman Lurie Sklar & Simon, Ltd. Cottrell concentrates on complex litigation, insurance, and risk management, Weiss on computer law and litigation.

SPF/PC™

ACTUALLY, there is no comparison. SPF/PC is the best full-screen editor available for the IBM Personal Computer.

It looks and works like IBM's large system SPF editor.

- SPF/PC can use up to 786K of memory as workspace.
- Word processing commands.
- 4-way scrolling.
- Split screen support.
- On-line help facility.
- Can edit up to 240 character records.
- Monochrome or color supported.
- Instantaneous screen display.
- Block Move/Copy/Repeat/Delete/Overlay/Shift/Exclude
- Automatic line numbering supported.
- 40 user-definable Program Function Keys.
- Direct interface to DOS commands for PC DOS 2.0 users.
- Browse sub-system.
- Move/Copy sub-system copies any file format.
- Utilities include: Rename/Delete/Print/Directory list.

AND MUCH MORE . . .

UPLOAD/DOWNLOAD sub-system available to SPF/PC users for \$50.00.

\$149.95 SPF/PC requires 128K, PC DOS, and 1 disk drive.

THE ODD-COUPLE™

Allows the APPLE and IBM/PC to communicate with each other.

- Connect APPLE to PC, APPLE to APPLE, and PC to PC.
- Transfer any file in either direction.
- CHAT mode allows direct communications through the keyboard.
- An Equipment Profile allows description of your operating environment.
- Communicate Direct or through a Modem at speeds up to 9600 baud (bps).
- Written entirely in machine language for speed and efficiency.

REQUIREMENTS:

APPLE — 48K, 1 disk drive, Serial Interface

IBM — 64K, 1 disk drive, Serial Interface

\$79.95

For orders and dealer information write or call Rogue River Software, 2822 Tahitian Ave., Medford, OR 97504, (503) 779-3002. Mastercard/Visa, Check, or P.O. accepted. Add \$5.00 for shipping. Canada \$10.00. Foreign \$15.00.

IBM is a registered trademark of International Business Machines Corp. APPLE is a registered trademark of Apple Computer Inc.

CIRCLE 182 ON READER SERVICE CARD

THE **WORD** CONNECTION **FILE**



8" DISKETTE SYSTEM FOR THE IBM PC

8" Diskette file exchange between the IBM PC and most micro-mini-mainframe computer systems.

8" Diskette text document exchange between the IBM PC and many word processing systems.

8" Diskette to 5¼" formats for hundreds of other systems, even Textpack and Wordstar to the new DisplayWrite 2 format.

FLAGSTAFF ENGINEERING / P. O. Box 1970 / Flagstaff, AZ 86002
Telephone 602-774-5188 / Telex 705609 FLAG-END-UD

Courseware Basics

Whether you design, buy, or evaluate educational software, your decisions should be guided by the instructional principles that make good courseware a valuable teaching aid.

Courseware design and evaluation are mirror images of each other. The principles that guide the designer who creates educational software can guide the consumer as well. Whether you buy courseware, design it yourself, or commission others to design it for you, you should be aware of some of the basic components of good courseware.

Using courseware should be as simple as using a book. Books are replete with aids that organize and help learners access information: the table of contents, index, and glossary. Courseware should mimic this convenience—but how? One solution is the menu. Courseware that offers a menu up front does two things: It organizes its activities, and it gives the learner access to them in a stable, consistent way.

With careful programming, a courseware developer can give the menu several other functions. The order of menu entries can recommend or restrict learner selection, which is important if the material must be presented in a specific sequence. A menu that indicates which sections have been completed emphasizes the learner's progress while providing a reminder of what remains.

A menu can orient the learner by creating a gateway into and out of the software's major activities. As a central reference point, the menu helps stabilize the learner and prevent the disorientation that



is rare in books but common in complex software. But the line between the simple and the simply overwhelming is easily crossed. Courseware that offers too many menus burdens the learner's memory with unnecessary options and decision points. Too many options on a menu are equally taxing: five to nine options is a reasonable range. If more choices are absolutely necessary, the menu should be divided into two pages with easy access back and forth. A proliferation of menus makes a statement about the amount of content, indicating, perhaps, that the courseware ought to be divided into separate parts.

No matter how many menus and submenus a program contains, they should

be intelligently organized. When one menu leads the learner to another menu, the option selected from the first menu should become the title for the submenu. Courseware with several layers of menus should offer a shortcut from the lowest level back to the highest.

Serving Suggestions

Students rarely read textbooks from beginning to end; they tend to skip and browse as their interest and understanding dictate. In addition, students often personalize books by highlighting important sections, writing notes in the margins and marking pages.

Courseware, too, should give the learn-

You'll be sorry

**if you buy an IBM PC
multifunction
or graphics board
before August 17.**



PARADISE

S Y S T E M S , I N C

IBM is a registered trademark of International Business Machines Corporation, Inc.

EDUCATION

er the opportunity to personalize. At the very least, the software should provide the electronic equivalent of a bookmark. One of the unique annoyances of educational software is its habit of forcing the learner to start over each and every time. Menus mitigate this inconvenience, but they usually return the learner only to the beginning of a major section. Ideally the learner should be able to mark and return to the exact spot at which he left off.

The learner should feel in control of the courseware, not the other way around. Generally, a feeling of control means being able to anticipate and understand events on the screen. More specifically, learners should be able to influence such variables as the rate, order, and difficulty level of the information presentation.

Courseware that is too automated can rob the learner of control. Imagine your reaction if you were reading and the pages of your book began to turn themselves. While it's not likely in a book, it's not rare in courseware that uses the timed pause to change or add new information to a display. A timed pause is a programmed guess about how long it will take the reader to understand the material or to reach the end of a paragraph. It is simpler and less surprising to let the reader signal with a keystroke that he is ready for new information.

A variation on the timed pause is flashing feedback—diagnostic messages that twinkle in and out of sight too fast to read but just slow enough to warn you that you've missed something important. Flashing feedback can be more destructive than helpful; information important enough to display should remain on the screen long enough to be read.

An important part of learner control is understanding the input process. Mice and joysticks aside, most learners interact with courseware through keystrokes. This interaction should be consistent: Once the learner is accustomed to pressing the plus key to add text to a display, switching to entering the word space is confusing. Similarly, keys should not be assigned multi-

ple functions, such as pressing Enter both to indicate a completed answer and to advance from frame to frame.

In addition, key assignments should be as intuitively sensible as possible. If pressing Shift and the plus key advances you page by page, then Ctrl+ might advance you chapter by chapter.

Another side of learner control is learner orientation: Make sure the learner knows where he is. Books provide position cues that CRTs lack. The pages of an open book give you a sense of how far you are from the beginning and the end. Courseware can provide similar information by including a header at the top of every frame to identify the current section of the program by title and page number.

The Final Exam

Courseware may be the wave of the future, but it hasn't left the old-fashioned test behind. The final exam and the surprise quiz still threaten many learners. Tests on computers can be even more intimidating than their paper counterparts. Pencil-and-paper tests may not be fun, but at least they are familiar.

Inform the learner that testing is used in the program, possibly by listing it as a menu option. When the learner selects the testing option, an introductory tutorial should anticipate his or her questions and describe what is expected of the learner and what the learner can expect: What kinds of questions are used? How are questions answered—by typing out answers or by selecting a letter? How many questions does the test contain? Is skipping allowed? Is going back over an answer allowed? Is the test timed? What happens if the time runs out?

Considerate courseware tests learners discreetly. Computer-based testing should play down the authoritarian image of the computer by aiming to give the learner at least as much freedom as he or she would have on a paper-based test.

In the next issue I'll discuss more elements of good courseware, including screen layout and diagnostic feedback. ■

The Most Powerful Text Editor and the Best C Compiler for your IBM-PC

EMACS™

The multi-window editing system you have all been waiting for!

EMACS: Incredibly powerful text editor with extraordinary features. (Full Gosling implementation)

EMACS: Divide your screen into windows and edit several files at once.

EMACS: Extensible via keyboard macros and built-in compiled MLISP programming language.

EMACS: Full freedom on keybindings; built-in documentation, abbreviations, C, Pascal and MLISP programming language assist, wildcard searching.

EMACS: Many other powerful features, too!

Price: \$375/binary, \$995/source
(requires at least 384K)

LATTICE® C COMPILERS

Published benchmarks show **Lattice C** produces fastest and tightest code for the 8086 family.

Lattice C also supports the large, medium, compact and small address models.

UniPress sells native **Lattice C** compilers running on the PC for \$425.

Optional **PLINK**—full function linkage editor including overlay support.
Price: \$395

We also sell Unix-based cross compilers producing code for the PC. For example, write programs on a VAX Unix for execution on the PC.

Cross compilers priced from \$3000.

Call or write for more information:

UniPress Software, Inc.

2025 Lincoln Highway
Edison, NJ 08817
201-985-8000 • Telex 709418
Order Desk: 800-222-0550 (outside NJ)
Mastercard and Visa

Lattice is a registered trademark of Lattice, Inc.
EMACS is a trademark of UniPress Software, Inc.
Unix is a trademark of Bell Laboratories.
MS-DOS is a trademark of Microsoft.
IBM PC is a trademark of IBM.

CIRCLE 190 ON READER SERVICE CARD



WEEK

THE NEWS
WEEKLY FOR
IBM SYSTEM
MICRO
COMPUTERS

The first weekly newspaper designed to
give key executives the latest
IBM Personal Computer news and analyses—
as soon as it happens!

To keep your company in the forefront of today's rapidly changing IBM Personal Computer technology, you need timely information. Information that's clearly written, bringing you the news the way you need it, when you need it. You need PC WEEK.

PC WEEK is the first and only weekly newspaper devoted to IBM Personal Computer news—with the latest breaking stories as they develop.

PC WEEK follows and reports the news—up to 48 hours before publication—so you learn what's new *when it's new!* You'll find research updates, strategic analysis, new hardware and software reviews, insights on future industry concerns and controversies, and the timely information you need to help make you more productive and efficient.

Every week you'll find outstanding features and departments covering...

- **NEWS:** PC WEEK brings you analytical reports on the major topics of the day. Product announcements and

company changes are analyzed and put into perspective, helping you plan for future investments and developments.

- **STRATEGIES:** Every week you get an in-depth profile of a leading user company and how they use their IBM and compatible personal computers. Case studies help you evaluate the success and failure of new applications—some you even may have been considering.
- **INDUSTRY TRENDS:** Discover what's happening behind the scenes in new product development from both hardware and software manufacturers and what this could mean to the future of your company.
- **PRODUCT REVIEWS:** In-depth reviews of important new hardware and software releases tell you what product is right for your operation, and the technical and financial considerations involved.

- **FOCUS ON:** The latest news and events in specific product areas are detailed every week. We cover file systems, 3270 products, graphics software, input hardware, database managers, program generators, multifunctional applications—the information you need for your IBM installation.

- **BUYERS GUIDES:** Special sections with careful evaluations and comparative charts to help you select the proper peripherals and software packages for your operation. From word processing to local area networks or compatibles, you'll find complete and unbiased reviews and listings.

Your subscription to PC WEEK is complimentary if you qualify. Take a moment, fill out the Qualification Form at right and return it to PC WEEK today.

PC WEEK, your vehicle to stay in the forefront of tomorrow's IBM Personal Computer technology.

PC WEEK

Get the news you need every week, first hand, with PC WEEK.

Complimentary Subscription Application

YOU MUST ANSWER ALL QUESTIONS TO QUALIFY.

1. ☐ Please accept my request for a complimentary subscription to PC WEEK.

2. ☐ No, I do not want to receive PC WEEK.

3. Primary business activity of your firm at this location (check one only)

- | | |
|---|---|
| <input type="checkbox"/> 1 Manufacturing of computer equipment, computers, DP hardware, peripherals | <input type="checkbox"/> 9 Finance, banking, insurance, real estate |
| <input type="checkbox"/> 2 Manufacturing other | <input type="checkbox"/> 10 Health, medical service |
| <input type="checkbox"/> 3 Agriculture, mining, construction | <input type="checkbox"/> 11 Legal |
| <input type="checkbox"/> 4 Transportation | <input type="checkbox"/> 12 Education |
| <input type="checkbox"/> 5 Communications | <input type="checkbox"/> 13 Data processing, computer service |
| <input type="checkbox"/> 6 Utilities | <input type="checkbox"/> 14 Other business services |
| <input type="checkbox"/> 7 Computer related retailer | <input type="checkbox"/> 15 Government |
| <input type="checkbox"/> 8 Non-computer related retailer or wholesaler | <input type="checkbox"/> 16 Consultant |
| | <input type="checkbox"/> 17 Other (please specify) |

4. Your title: (Check one appropriate box)

- | | |
|---|---|
| <input type="checkbox"/> 1 Pres./Owner/Dir./Chmn./Partner | <input type="checkbox"/> 15 Dir./Mgr EDP/MIS Operations |
| <input type="checkbox"/> 2 Vice-Pres./Gen Mgr | <input type="checkbox"/> 16 Dir./Mgr Information Ctr |
| <input type="checkbox"/> 3 Controller/Treasurer | <input type="checkbox"/> 17 Business Microcomputer Specialist |
| <input type="checkbox"/> 4 Vice-Pres Finance | <input type="checkbox"/> 18 Systems Analyst |
| <input type="checkbox"/> 5 Chief Accountant | <input type="checkbox"/> 19 Data Base Administrator |
| <input type="checkbox"/> 6 Vice-Pres Operations | <input type="checkbox"/> 20 Vice-Pres./Dir R&D |
| <input type="checkbox"/> 7 Dir./Mgr Purchasing | <input type="checkbox"/> 21 Vice-Pres./Dir Engineering |
| <input type="checkbox"/> 8 Dir./Mgr Office Systems | <input type="checkbox"/> 22 Dir./Mgr Plant or Prod |
| <input type="checkbox"/> 9 Vice-Pres Sales/Sales Mgr | <input type="checkbox"/> 23 Chief Engineer |
| <input type="checkbox"/> 10 Dir./Mgr Marketing | <input type="checkbox"/> 24 Systems Engineer |
| <input type="checkbox"/> 11 Dir./Mgr/Chief of EDP/MIS | <input type="checkbox"/> 25 Design/Production/Research Engineer |
| <input type="checkbox"/> 12 Dir./Mgr Programming | <input type="checkbox"/> 26 Consultant |
| <input type="checkbox"/> 13 Dir./Mgr Systems & Procedures | <input type="checkbox"/> 27 Educator |
| <input type="checkbox"/> 14 Dir./Mgr Communications | <input type="checkbox"/> 28 Other (please be specific) |

5. Do you have any MAINFRAME computers or MINICOMPUTERS on site at this location?

- ☐ Yes (If yes, please report accurately below for the two largest.)
☐ No

Manufacturer	Model	Quantity

IBM or Compatible Personal (Micro) Computer Information for this location:

(Please report accurately for each model indicated)

Manufacturer's Name, Model	6. Currently Owned (Quantity)	7. Plan to Purchase Within 0-12 Months (Quantity)	13-24 Months (Quantity)	25-36 Months (Quantity)
IBM PC				
IBM PC XT				
IBM XT/370				
IBM PC/3270				
IBM PCjr				
IBM Compatibles (Compaq, Eagle, etc.)				
Other (Not IBM or Compatibles)				

7a. In which of the following ways are you yourself involved with this Personal (Micro) Computers at your location?

- | | |
|---|--|
| <input type="checkbox"/> A Use them | <input type="checkbox"/> F Other Involvement (specify) |
| <input type="checkbox"/> B Recommend them | |
| <input type="checkbox"/> C Establish specifications | |
| <input type="checkbox"/> D Approve purchase | <input type="checkbox"/> G No involvement |
| <input type="checkbox"/> E Acquire them | |

8. The Personal (Micro) Computers purchased for this location would be:

- ☐ 1 For internal use ☐ 3 Other (please specify)
☐ 2 For resale

Full company name and company address must appear in spaces below for application to be processed.

OR AFFIX YOUR BUSINESS CARD PW 1160

Name	
Title	
Company Name	
Division	Telephone Number
Company Street Address	
Company City	State Zip

9a. How are Personal (Micro) Computers normally obtained for this location?

- | | |
|--|---|
| <input type="checkbox"/> A Direct from manufacturer | <input type="checkbox"/> E System house |
| <input type="checkbox"/> B Manufacturer's representative | <input type="checkbox"/> F In-house (company) store |
| <input type="checkbox"/> C Distributor | <input type="checkbox"/> G Other (please specify) |
| <input type="checkbox"/> D Retail computer store | |

9. Please indicate below the communications capability for which these Personal (Micro) Computers are used.

- | |
|--|
| <input type="checkbox"/> A Communicate with remote timesharing or database |
| <input type="checkbox"/> B Communicate with internal mainframe or minicomputer |
| <input type="checkbox"/> C Used in local area network |
| <input type="checkbox"/> D Download data from mainframe or remote service |
| <input type="checkbox"/> E None of the above |

9a. Please indicate below the applications for which these Personal (Micro) Computers are used.

- | | |
|--|--|
| <input type="checkbox"/> 1 Accounting | <input type="checkbox"/> 9 Graphics Design |
| <input type="checkbox"/> A Accounts Payable | <input type="checkbox"/> 10 Personal Time Management |
| <input type="checkbox"/> B Accounts Receivable | <input type="checkbox"/> 11 Portfolio Management |
| <input type="checkbox"/> C Billing & Collection | <input type="checkbox"/> 12 Programming |
| <input type="checkbox"/> D General Ledger | <input type="checkbox"/> 13 Project Management |
| <input type="checkbox"/> E Inventory | <input type="checkbox"/> 14 Process Control |
| <input type="checkbox"/> F Order Entry & Invoicing | <input type="checkbox"/> 15 Scientific or Engineering Applications |
| <input type="checkbox"/> G Time Billing | <input type="checkbox"/> 16 Statistical Analysis |
| <input type="checkbox"/> 2 Communications | <input type="checkbox"/> 17 Tax Calculation or Planning |
| <input type="checkbox"/> 3 Data Base Management | <input type="checkbox"/> 18 Word Processing |
| <input type="checkbox"/> 4 Data Input/Analysis | <input type="checkbox"/> 19 Other |
| <input type="checkbox"/> 5 Education | |
| <input type="checkbox"/> 6 Electronic Mail | |
| <input type="checkbox"/> 7 Entertainment (Games) | |
| <input type="checkbox"/> 8 Financial Planning | |

10. Do you help acquire, recommend, specify or approve any of the products or services below?

- ☐ Yes (If yes, please check all that apply)
☐ No

- | | |
|---|--|
| Computers | <input type="checkbox"/> 24 Payroll |
| <input type="checkbox"/> 1 Mainframe | <input type="checkbox"/> 25 Time Billing |
| <input type="checkbox"/> 2 Minicomputer | <input type="checkbox"/> 26 Financial Planners/Spreadsheet |
| <input type="checkbox"/> 3 Personal (Micro) | <input type="checkbox"/> 27 Project Managers |
| Peripheral Equipment | <input type="checkbox"/> 28 Word Processors |
| <input type="checkbox"/> 7 Letter Quality Printer | <input type="checkbox"/> 29 Compilers |
| <input type="checkbox"/> 8 Graphics Printer | <input type="checkbox"/> 30 Database Managers |
| <input type="checkbox"/> 9 High Speed Printer | <input type="checkbox"/> 31 Program Developers/Generator Tools |
| <input type="checkbox"/> 10 Color Monitor | <input type="checkbox"/> 32 Business Graphics |
| <input type="checkbox"/> 11 Monochrome Displays | Outside Services |
| <input type="checkbox"/> 12 Modems | <input type="checkbox"/> 34 Maintenance |
| <input type="checkbox"/> 13 Hard Disk | <input type="checkbox"/> 35 Education/Training |
| <input type="checkbox"/> 14 Tape Backup System | <input type="checkbox"/> 36 Software/Systems Design |
| <input type="checkbox"/> 15 CPU Compatibility Card | <input type="checkbox"/> 37 Remote Computing |
| <input type="checkbox"/> 16 Memory Board | <input type="checkbox"/> 38 Database Services |
| <input type="checkbox"/> 17 Communications Port | <input type="checkbox"/> 39 Other |
| <input type="checkbox"/> 18 Plotters/Charting Devices | Expendables |
| <input type="checkbox"/> 19 Local Area Networks | <input type="checkbox"/> 41 Diskettes |
| Software Packages | <input type="checkbox"/> 42 Stock Paper |
| <input type="checkbox"/> 21 Communications | <input type="checkbox"/> 43 Forms & Other Consumables |
| <input type="checkbox"/> 22 Accounting | |
| <input type="checkbox"/> 23 Order Entry/Inventory | |

11. Are there any other individuals at this location that would qualify for a complimentary subscription to PC WEEK?

Name _____ Title _____

Name _____ Title _____

Your Signature _____

Your Title _____

Date _____

Please be sure to sign your name and list your actual title above.
See other side for making instructions

SEAL THIS SIDE ONLY—DO NOT USE STAPLES.

FOLD HERE



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS

PERMIT NO. 3838

NEW YORK, NY

POSTAGE WILL BE PAID BY ADDRESSEE

PCWEEK

P.O. Box 5920

Cherry Hill, NJ 08034



Drowning in a sea of solutions?

Help's within reach...



Applications backlog. Technology blur. Mounting user pressures. Staying abreast of changing prices. A tidal wave of problems!

Even if some answers are available, you have to go to too many sources and sift through so much information, there's not enough time to locate the solutions to your immediate and most important problems.

Well, help IS within easy reach—in the form of an information system that displays all your current software, hardware and communications options for instant reference.

That system is DATA SOURCES, and you're invited to make it work for you. Simply fill in the coupon and we'll send you DATA SOURCES 4 quarterly editions at 33% off their regular price.

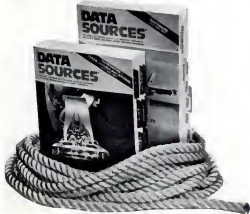
What DATA SOURCES does is organize your options. It guarantees that you've considered all relevant products by guiding you to those with the best possibility of success.

DATA SOURCES is a conveniently sized, extremely well-organized and skillfully indexed 2-volume reference...maintained on a data-base, constantly updated and published quarterly

YOU GET...

HARDWARE—Over 16,000 products from Micros to Mainframes including peripherals—terminals, printers, memory devices, etc...organized by systems compatibility

SOFTWARE—The largest available inventory of 18,000 business packages for micros, minis, and mainframes including operating systems, utilities, and application packages.



COMMUNICATIONS EQUIPMENT—From modems and multiplexors to local networks, carriers and services, plus all diagnostic and test equipment.

SERVICES, SUPPLIER, SUPPORT—Most complete organized listing of suppliers from installation design to maintenance and data center operations—over 8,000 companies.

NEW FEATURES...

- ✓ **Software Index**—by package name.
- ✓ **Quick-reference product comparison charts.**
- ✓ **Before-you-buy selection criteria and checklist.**
- ✓ **Product Hotline**—the very latest information on products announced between issues of Data Sources.

ORDER NOW AND SAVE \$60

Yes! Rush me the latest two-volume edition of DATA SOURCES and enter my subscription at \$150 for 4 quarterly editions. I save a full 33% off the regular price of \$210.

Name

Title

Company

Address

City State Zip

Telephone

Nature of Company's Business

Please check appropriate box: ☐ END USER ☐ VAR/OEM

☐ DISTRIBUTOR ☐ DP MFG ☐ OTHER

An information product of Ziff-Davis Publishing Company Satisfaction guaranteed.

SAVE TIME...CALL DIRECT 1-800-227-1617

EXT. 251

Return coupon to: (In Ca., 1-800-772-3545 Ext. 251)

DATA SOURCES

P.O. Box 5845, Cherry Hill, N.J. 08034

Residents of Ca., Co., Ct., D.C., Fl., Ill., Ma., Mo., N.J., N.Y. please add applicable state taxes.

T285



INDEPENDENT STORE IN NYC DEDICATED TO IBM® PC SOFTWARE AND PERIPHERALS ONLY

IN STORE WE DEMONSTRATE MOST PRODUCTS WE SELL — BY APPOINTMENT ONLY

STORE HOURS: 9:00 A.M. — 5:30 P.M. E.S.T. MON. — FRI.

Saturdays closed for months of July, Aug., Sept.

Terms, conditions and prices differ in our store.

PC LINK, CORP. 29 WEST 38TH ST. 2ND FL., NEW YORK, NY 10018

HELIX BUBBLE MEMORY BOARDS CALL WE ARE CELEBRATING OUR FIRST ANNIVERSARY.

All Prices Listed here are strictly subject to our current stock Available for Anniversary Sale.

BUSINESS SOFTWARE

ALPHA SOFTWARE	
DATA BASE MANAGER II	\$205.00
EXECUTIVE PACKAGE	109.00
TYPE FACES	89.00

ASHTON-TATE	
DBASE III	CALL
BOTTOM LINE STRATEGIST	299.00
FINANCIAL PLANNER	399.00
FRIDAY	179.00

CONTINENTAL	
HOME ACCOUNTANT PLUS	85.00
ULTRA FILE	139.00
TAX ADVANTAGE	45.00
PROPERTY MANAGEMENT	39.00

ENERTRONICS	
ENERGRAPHICS	CALL

FOX & GELLER	
D GRAPH	189.00
DIUTIL	69.00
GRAFOX	209.00
OZ	CALL
QUICKCODE	189.00

FRIENDLYSOFT	
FRIENDLY WRITER	50.00

HARVARD SOFTWARE	
HARVARD PROJECT MANAGER	CALL

HAYES	
SMARTCOM II	95.00

INNOVATIVE SOFTWARE	
TIM IV	CALL

I U S	
ACCOUNTING AR AP GL ea	295.00
INVENTORY CONTROL	295.00
ORDER ENTRY	295.00
PAYROLL	345.00
EASY WRITER II SHELLER MAIL	CALL
EASY FILER	240.00
EASY PLANNER	169.00

LOTUS DEVELOPMENT CORP.	
LOTUS 1-2-3 (NO MAIL ORDERS)	CALL
SYMPHONY (NO MAIL ORDERS)	CALL

MICRO DATA BASE	
KNOWLEDGE MAN	CALL

MICRO PRO	
INFOTAR	CALL
WORDSTAR	CALL
WORDSTAR PROFESSIONAL	CALL

MICROSOFT	
MULTIPLAN	179.00
COMPLERS	CALL

NORTH AMERICAN BUSINESS	
MEMORY SHIFT	69.00

NORTON COMPUTER	
NORTON UTILITIES	55.00

PC SOFTWARE	
CREATBASE	65.00

PEARL SOFT	
PERSONAL PEARL	CALL

ROSE SOFT	
PROKEY 3.0	89.00

SOFTWARE ARTS	
TK SOLVER	299.00
FINANCIAL MANAGEMENT	89.00
MECHANICAL ENGINEERING	89.00

SOFTWARE SYSTEMS INC.	
MULTIMATE	295.00

SORCIM	
SUPERCALC III	299.00

VISICORP	
VISICALC FOUR	179.00
DESKTOP PLAN	190.00
VISIFILE	190.00
VISITREND VISIPLLOT	190.00
VISINWORD	190.00

DISK DRIVES	
CORVUS	CALL
PEGASUS	CALL
QUIME T142	CALL
SYSGEN	CALL
TANDON TM 100-2	200.00

MULTIFUNCTION BOARDS	
54 RAM CHIPS	55.00
AST CARDS	CALL
QUADBOARD CARD	CALL
AMDEK MAI CARD	CALL
PC MOUSE	CALL
FTG LIGHTPEN	CALL
PLANTRONICS COLOR PLUS CARD	CALL
HERCULES	CALL
PRINCETON GRAPHICS	CALL

ENTERTAINMENT & EDUCATION	
ATT TRAINING PACKAGES	55.00
ATTACK ON ALTAIR	29.00
CUSTOMER FACTS IN 5	22.00
CONQUEST	29.00
DEADLINE	37.00
DIGGER	29.00
THE EXTERMINATOR	29.00
FLIGHT SIMULATOR	35.00
FRIENDLY ARCADE	32.00
FRIENDLY PC INTRO SET	32.00
FROGGER	25.00
GORGON	29.00
HIDE & SINK	22.00
HI RES #4	27.00
MOON BUGS	29.00
MY LETTERS, NUMBERS & WORDS	32.00
PC CRAYON	39.00
PC TUTOR	49.00

PLANET FALL	39.00
SEXPENTINE	25.00
SPINNAKER SERIES	CALL
SPYDER	29.00
STYX	29.00
SUSPENDED	39.00
WITNESS	39.00
WIZARDRY	49.00
ZORK I, II, III	27.00
ZURAN DEFENDER	25.00
FUNTASTIC	
BIG TOP	27.00
COSMIC CRUSADERS	27.00
MASTER MINER	27.00
SNACK ATTACK	27.00

ACCESSORIES

CURTIS PRODUCTS	
DISPLAY PEDESTAL	\$50.00
MONO CABLE	38.00
KEYBOARD CABLE	30.00
SYSTEM STAND	17.00
KRAFT JOYSTICK	39.00
HAYES MACH III JOYSTICKS	45.00

MONITORS

AMDEK 310A	\$175.00
COLOR II	CALL
PRINCETON GRAPHIC HX-12	469.00
SR-12	CALL
ZENITH RGB MONITOR	499.00

MODEMS

HAYES SMART MODEM	\$205.00
HAYES SMART MODEM 1200	
HAYES SMART MODEM 1200B	449.00

DISKETTES

DYSAN	
SS D D	\$30.00
DS D D	38.00
MAXELL	
SS S D	27.00
DS D D	38.00
VERBATIM (5 year warranty)	
21144 HEAD CLEAN KIT	10.50
SS D D	26.00
DS D D	36.00

PRINTERS

DIABLO P32 D-MATRIX	CALL
DIABLO 630	\$1699.00
DIABLO 630 TRACTOR FEED	249.00
DYNAX DX-15 OR DX-25	CALL
PROWRITER F10	825.00
IDS PRISM 132 COMPLETE	1499.00
OKIDATA 92P	465.00
93P	699.00
TOSHIBA P1351	1499.00
TOSHIBA P1340	CALL
EPSON FX SERIES	CALL
NEC 3550	CALL
PRINTER CABLE PARALLEL	25.00

CALL TOLL FREE 800-221-0343 All prices listed in this ad are effective Aug. 1-31, 1994. All brands are Registered Trademarks. IBM is a Registered Trademark of IBM Corp. **IN NEW YORK CALL 1-212-730-8036**

TERMS AND CONDITIONS

We reserve the right to repair, replace or return to manufacturer for repair all goods acknowledged faulty and returned on receipt by customer. Customer must call for Return Authorization Number before returning any goods. Prompt attention will be given to all damaged and faulty returned goods. Any goods returned for credit are subject to 10% restocking charge, plus shipping charge. No refund for credit on any software. Customer must deal with the manufacturer directly if the customer finds any false claims made by

the manufacturer. All goods are shipped U.P.S. only. Add 2% of price or minimum of \$3.00 for shipping. We do not ship C.O.D. Please allow one to two weeks for personal or corporate checks to clear. To expedite shipping send money order, certified cashiers check or charge to your VISA, MasterCard, WE DO NOT Add a Service Charge For Credit Card Usage. Prices subject to change without notice. NOT RESPONSIBLE FOR TYPOGRAPHICAL ERRORS

CIRCLE 360 ON READER SERVICE CARD

New On The Market

HARDWARE

StorageMaster 500 Series

Two 5.25-inch Winchester drives with either 18 or 30 megabytes of formatted storage capacity. Each of the standalone Winchester subsystems includes the drive, power supply, and fan housed in a single cabinet. A single-board drive controller is supplied that takes up one slot within the user's system.

(List Price: 18 MB, \$2,495; 30 MB, \$3,390)

Control Data Corp.
2200 Berkshire Ln. N.
Plymouth, MN 55441
(612) 853-3276

CIRCLE 791 ON READER
SERVICE CARD

user to set the sampling rate at which the EMG data are averaged and displayed. The software can also incorporate user-defined subliminal messages to reinforce relaxation.

Also included are a workbook of relaxation exercises and an audio tape that provides guidance in using recommended "tension-relaxation" game techniques to reduce stress. (List Price: \$139.95)

Requires: 64K RAM, one disk drive, PC-DOS, joystick adapter.

Synapse Software
5221 Central Ave.
Richmond, CA 94804
(415) 527-7751

CIRCLE 781 ON READER
SERVICE CARD

HiNet/PC Adapter

An adapter board permitting the user's system to link onto the HiNet local area network (LAN) system. The board adds 64K of RAM, a Z-80 microprocessor, an RS-232 serial port, and a HiNet interface to the user's system. The Z-80 microprocessor handles all network interface functions, allowing the user's system to continue independent operations without added overhead.

The Z-80 chip also permits the user's system to run CP/M-80 applications.

Up to 63 workstations and peripherals can be linked together on the HiNet LAN, which can support MS-DOS, CP/M-86, and CP/M software. The LAN

can be configured through the addition of master station options to use from 15 to 184 megabytes of storage capacity and to link with mainframe or ICL-protocol systems.

(List Price: One board, \$495)
Digital Microsystems
1840 Embarcadero
Oakland, CA 94606
(415) 261-1034
TWX: 910-366-7310

CIRCLE 787 ON READER
SERVICE CARD

TeleClerk 20M

A digital sound storage and playback device with the ability to store up to 50 minutes of speech or music on its internal hard disk. Average access to any portion of a recording is 30

RELAX

A hardware/software health-care system designed to help the user reduce personal stress levels using graphic displays on a monitor screen. The RELAX system features a headband and control unit that plugs into the user's system. The control unit's headband incorporates electromyograph (EMG) sensors that measure electrical activity in the wearer's muscles, an indicator of stress. The software presents the data from the sensors as a graphic display on the user's monitor or as a hardcopy printout. The control unit also permits the



RELAX, Synapse Software

milliseconds, permitting the unit to respond to vocal phone inquiries logically. The unit's built-in Z-80 microprocessor permits it to operate independent of the user's system after it has been programmed, freeing the user's computer for other tasks.

TeleClerk 20M includes two standard interfaces: an RJ-11 modular jack for connecting the unit directly to phone lines, and a 9600-bps RS-232 serial port for linking the device to the user's system. Optional interfaces available include a second 300- to 9600-bps RS-232 port or a Centronics parallel port for connecting a printer. Also included within the unit is a real-time clock with battery backup, and an analog/digital voice converter optimized for a 300-3500 Hz effective audio frequency range.

(List Price: \$7,800)

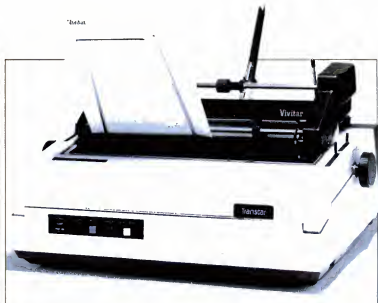
Dialog Communications Corp.

731 Columbia Ave.
P.O. Box 95
Franklin, TN 37064
(615) 790-2882

CIRCLE 782 ON READER
SERVICE CARD

Cut-Sheet Feeder

A line of sheet feeders for a wide range of daisy wheel and other single-sheet printers. The feeders can be attached to a printer in seconds without tools or electrical connections, and can



Cut-Sheet Feeder, Vivitar Computer Products, Inc.

hold up to 200 sheets of paper. Variable paper positioning from 7 to 14 inches allows the printer to use paper in horizontal or vertical positions.

Cut-sheet feeders are available to fit printers from Transtar, C. Itoh, NEC, Diablo, Morrow, Silver-Reed, Televideo, Toshiba, and other manufacturers.

(List Price: \$399)

Vivitar Computer Products, Inc.

P.O. Box C-96975
Bellevue, WA 98009
(206) 454-9250

CIRCLE 784 ON READER
SERVICE CARD

FAXT-96 Modem

An internal modem board providing data transfer rates of up to 9600 bits per sec-

ond over ordinary phone lines. The board plugs into an expansion slot in the user's system, connects to telephone lines with a modular phone jack, and connects to a synchronous communications adapter board via a supplied cable. Features include synchronous half-duplex operation, multiple speed selection, programmable tone generation and detection, and compatibility with CCITT protocols at rates from 300 to 9600 bps.

(List Price: \$1,995)

Gamma Technology, Inc.
2452 Embarcadero Way
Palo Alto, CA 94303

(415) 856-7421
TWX: 910-373-1296

CIRCLE 783 ON READER
SERVICE CARD

Universal Programmer, 160 Series

A hardware/software system for programming memory and logic into a range of IC chips. The 160 Series Universal Programmer allows the user to employ software instead of complex hardware to control the algorithms for programming PROMs, EPROMs, EEPROMs, PALs, and IFLs. The system includes a programming station with two zero insertion force sockets—one for 28-pin and one for 40-pin ICs—as well as an interface card that plugs into a spare slot in the IBM PC. Software provided with the system includes *MemSoft*, for programming memories, and *LogiSoft*, for

PAL and IFL logic programming.

The two programs contain all of the necessary programming algorithms and device databases for almost 2,000 device types. The menu-driven programs present the user with a selection of devices and programming operations using easy-to-follow screens. The user enters programming parameters for such programming operations as PROGRAM, READ, VERIFY, CHECK, and QUICK ERASE for EEPROMs. Nonprogramming operations possible with the Series 160 include display/edit, move, fill, save, and load. Most operations can be performed with single keystrokes, and the user is prompted

through the programming process by on-screen instructions in plain English. (List Price: With MemSoft only, \$4,995; with both packages \$5,495) Valley Data Sciences Inc. 2426 Charleston Rd. Mountain View, CA 94043 (415) 968-2900

CIRCLE 783 ON READER SERVICE CARD

Formwriter 2

A desktop laser page printer capable of producing up to eight full pages of letter quality business forms per minute. The unit incorporates 256K RAM to store fonts, logos, and signatures, allowing multiple fonts to be printed on the same line. Using a dry electrographic print process, it prints in a 300 x 300 dots per inch



VP-6802P Plotter, Panasonic Industrial Co.

matrix, producing high-quality images, excellent graphics, and dense black solids.

All of Formwriter 2's printing process components are housed in a single user-replaceable cartridge; the cartridges are rated at 2,000 copies each and are available in black, blue, and brown print colors. Paper trays hold single-sheet 17 to 21 lb. bond paper, overhead transparency foils, and label sheets.

The printer's required Farms Management software provides a directory of forms, fonts, logos, and signatures stored on the PC's disk. The software supports up to 125 different fonts, logos, or signatures, and up to 1,000 different forms. The printer and software both form one part of a complete forms processing system marketed by the manufacturer.

(List Price: Formwriter 2, \$5,000; Software, \$1,000) Sprinter Division

Computer Language Research, Inc. 2395 Midway Rd. Carrollton, TX 75006 (214) 934-7000

CIRCLE 785 ON READER SERVICE CARD

VP-6802P Plotter

A single-pen plotter with a writing speed of 18 inches per second, capable of drawing plots over an area up to 10.2 by 14 inches. The unit stores eight pens in a rack along one edge of the drawing surface, which can be chosen by the drawing arm under software control. The unit is also capable of unattended operation by using a chart advance option.

The VP-6802P is available with a parallel, GP-IB, or RS-232 serial interface. (List Price: \$3,200) Panasonic Industrial Co. One Panasonic Way Secaucus, NJ 07094 (201) 348-7183

CIRCLE 786 ON READER SERVICE CARD



Formwriter 2, Computer Language Research, Inc., Sprinter Div.

HARDWARE

Video-5

An add-on board permitting users of the Cubicomp CS-5 solid-modeling system to videotape created images. Video-5 synchronizes the display generator of the CS-5 system with an external video signal so that, with the addition of a sync generator and color encoder, high-quality graphics images can be recorded onto all standard video formats.

Video-5 allows users to record images in either U.S. (NTSC) or European (PAL) standard formats, on VHS, Beta, Umatic, and Type C videotape formats.
(List Price: \$900)
Cubicomp Corp.
3165 Adeline St.
Berkeley, CA 94703
(415) 540-5733

CIRCLE 774 ON READER
SERVICE CARD

COLORMAX

A multidisplay board for the IBM PC/XT, permitting simultaneous connection of a monochrome and a color monitor to a single card.

Features of the board include dedicated connectors for RGB and monochrome displays, an RCA jack for composite monitors, and on-board light pen circuitry.

Choice of display can be selected under software command, and the board permits custom definition of character sets. A parallel interface is available as an option.

(List Price: Standard version, \$499.95; with parallel interface, \$559.95)
Micromax
6868 Nancy Ridge Dr.
San Diego, CA 92121
(619) 457-3131

CIRCLE 761 ON READER
SERVICE CARD

SOLO

A training system consisting of a control console that is placed on-line between the user's system printer port and a special audio/digital cassette player, and proprietary training software. The system audibly and interactively guides the learner through the use of such



Video-5, Cubicomp Corp.

software as Lotus' 1-2-3, BASIC, dBASE II, Multiplan, and Wordstar.

The SOLO training software synchronizes the audio tape presentations to the screens presented on the user's system, providing audio reinforcement of the lessons and hands-on practice sessions. Correct and incorrect responses are acknowledged by the system, and help is given as needed. In total, the SOLO system is designed to emulate a self-paced, one-on-one student/instructor learning environment.

(List Price: Console and cassette player, \$169;

training packages, \$129 each)
Learning Automation Inc.
183 Guggins Ln.
Boxboro, MA 01719
(617) 264-4040

CIRCLE 779 ON READER
SERVICE CARD

FIXT

A plug-in ROM chip that provides a hard boot capability to the IBM PC for several add-on hard disks. With FIXT, the IBM PC can be booted from Davong, Datamac, Great Lakes (Pegasus), Percom, and Zobex hard disk systems. Plugged into the unused ROM socket of the



SOLO, Learning Automation Inc.

PC's motherboard, the chip provides a BIOS interface between the PC and the hard disk device.

FiXT allows the use of standard PC-DOS 2.0 disk partitioning and formatting facilities, and incorporates built-in diagnostics.

(List Price: \$70)

Golden Bow Systems
P.O. Box 3039
San Diego, CA 92103
(619) 298-9349

CIRCLE 762 ON READER
SERVICE CARD

DMS-816 Workstation

A diskless terminal for use with the HiNet local area network (LAN). The terminal features twin microprocessors (a Z80B and an 8088), allowing PC-DOS, CP/M-86, and CP/M soft-

ware to be run on the LAN; a built-in PC-mapped monochrome display; and an enhanced PC-compatible 94-key keyboard. Also featured are three ports—one RS-232 serial, one Centronics parallel, and one port to link the unit to the HiNet LAN.

(List Price: \$1,695)

Digital Microsystems
1840 Embarcadero
Oakland, CA 94606
(415) 261-1034
TWX: 910-366-7310

CIRCLE 775 ON READER
SERVICE CARD

SOFTWARE

Term/Difference Illustrator

A program for insurance professionals, capable of preparing presentation quali-

ty printouts comparing any term insurance (including modified 21 Whole Life) with any cash value insurance plan (including Universal Life and RLR). The comparison allows the prospective insurance buyer to invest the difference at any rate of interest, showing on the bottom line whether the term with the difference invested or the cash value policy is better suited to meet particular needs. The user may enter dividends for both policies and enter dividends to reduce premiums for the permanent plan.

The software's screens consist of a simple question-and-answer format to produce term conversion illustrations from existing files. Any company's rates and values for either of the policies being compared can be used.

The printouts show the agent's name, client's name, both insurance company names, all annual premiums, dividends, difference at interest, cumulative totals, summary, and bottom line conclusions.

(List Price: \$29.95)

Requires: 64K RAM, one disk drive, PC-DOS, 80-column printer.

ACS Software Publishing Co.
3255 Wing St., #330
San Diego, CA 92110
(619) 223-5331

CIRCLE 789 ON READER
SERVICE CARD

The Report Writer Jr

A word processing program designed for the IBM PCjr. The program creates files that can later be read and edited on a standard PC with any ASCII file word processor.

The Report Writer Jr provides full-screen editing capabilities with such features as block moves, copy, delete, as well as find only or find and replace options. It takes advantage of all PCjr keyboard editing functions such as Page Up, Page Down, Insertion, and Deletion.

(List Price: \$80)

Requires: 128K RAM, one disk drive, PC-DOS 2.1.

Monument Computer Service
Village Data Center
P.O. Box 603
Joshua Tree, CA 92252
(619) 365-6668

CIRCLE 792 ON READER
SERVICE CARD

Patient Recall System

A medical appointment-scheduling program that can generate and print out patient recall cards automatically. The software employs a system of menu-driven prompts to lead the operator through all phases of initial installation, operation, and report generation. By maintaining a complete patient file including name, address, previous visit date, and other data, *Patient Re-*



DMS-816 Workstation, Digital Microsystems



Expense Account Manager, Adaptive Software

call can generate the recall cards in response to the elapsed time interval entered by the operator.

The software can print 4- \times 6-inch continuous cards approved by the U.S. Postal Service. It can support approximately 35,000 patient files on a 10-megabyte hard disk drive.

(List Price: \$395)

Requires: 64K RAM, two disk drives, PC-DOS, 132-column printer.

Arctic Data Corp.
1839 First Ave.
Prince George, B.C.
Canada V2L 2Y8
(604) 562-5240
Telex: 047-7132

CIRCLE 763 ON READER
SERVICE CARD

Expense Account Manager

A program designed specifically to organize and track travel and entertainment expenses. Features include easy entry and correction of expenses, reminders of expenses often overlooked, and prompts for specific information required by the

IRS and corporate budget forecasts. For individuals who must charge out their expenses to a particular client or project, the software provides an option for subtotals by user-defined criteria. A table of frequently traveled trips is maintained to allow consistent reporting of automobile mileage.

Expense Account Manager automatically reconciles travel advances and tracks reimbursements, providing several reports for this purpose. An interface to Lotus' 1-2-3 is included for more complex manipulations of accumulated travel data. The system can also print out pocket recording sheets that can be used to record expenses as they are incurred for later entry into the system.

(List Price: \$150)

Requires: 128K RAM, one disk drive, PC-DOS.

Adaptive Software
1868 Cavell Ave.
Highland Pk., IL 60035
(312) 831-4420

CIRCLE 782 ON READER
SERVICE CARD

PC/FOCUS

An implementation for the IBM PC of the *FOCUS* mainframe database management system. *PC/FOCUS* combines an English nonprocedural language for queries, reporting, graphics, and financial modeling, with advanced database management facilities.

Also included with the software is Table Talk, a window-driven natural language interface based on artificial intelligence techniques. This facility enables novice users to report requests without keyboard typing. Table Talk visually assists the user through a series of static and pop-up screen windows that cover all phases of report creation. The last window offers the user a choice of immediate

execution of the report requested on the PC or on a linked mainframe system, or storing of the request for later execution.

Other facilities offered in *PC/FOCUS* include Link, a communications module enabling bidirectional data transfers between *PC/FOCUS* and mainframe *FOCUS* at up to 9600 bps, and *DIF FILES*, for writing data files in the Data Interchange Format used by many spreadsheet programs.

(List Price: \$1,595)

Requires: 512K RAM, 5 MB hard disk, PC-DOS 2.0.

Information Builders, Inc.
1250 Broadway
New York, NY 10001
(212) 736-4433

CIRCLE 783 ON READER
SERVICE CARD



PC/FOCUS, Information Builders, Inc.

NORTHERN SOFTWARE

88 Ryders Ln, Stratford, CT 06497

New larger facilities to serve you better:

School & corporate purchase orders accepted:

No additional charges for credit card orders:

Entertainment

Education

Business

Business contd.

Specials

Monitors

	Our Price		Our Price		Our Price		Our Price		Our Price
ARMOR		ADVANCED IDEAS		ALPHA		Extended Report Writer		INDEX	
Executive Suite	29.00	Graphics	29.00	Database Manager II	100.00	MICROSOFT	99.00	310A	175.00
ATARI/SGT		Wizard Of Words	29.00	Apple IBM Connection	185.00	Multiplan		300A	160.00
Defender	29.00	Lucky's Magic net	29.00	APPLIED SOFTWARE TECHNOLOGY		Word		300G	140.00
Centurion	29.00	SARNOFF EDUCATIONAL SERIES		Veratone	250.00	Word With Mouse		300L Color II Plus	379.00
Cosy Dug	29.00	Cometstar SAT	50.00	ASITON TATE		Financial Statement		PS	
Dorkey Kong	29.00	CBS SOFTWARE		Friday	190.00	Dudget		HX 12	485.00
Joust	29.00	College Board	110.00	d Base 2	320.00	Personal Investor		Max 12	190.00
Jonack Hunt	29.00	Gordon's Bridge	50.00	d Base II	Call	PEACHTREE		QUADRAM	520.00
Moore Patrol	29.00	Mastering The SAT	101.00	ASAP MICRO		Peach Tree 5000		TAXAN	
Ms. Pac Man	29.00	Murder By The Dozen	21.00	APR/AGI	350.00	Peach Tree 5000		RGB II	440.00
Pac Man	29.00	Match Wits	21.00	Inventory	270.00	PEACHTREE		RGB 420	535.00
Pole Patrol	29.00	COLE		Payroll	270.00	Personal Investor		UBI	125.00
Robotron	29.00	Advanced Lotus 1-2-3	45.00	BP	365.00	Personal Investor		12" Amber	142.00
Stargate	29.00	Advanced R Training	45.00	General Accounting	365.00	PEACHTREE			
EPY/AUTOMATED SIMULATIONS		Easy Winter Training	45.00	Job Costing	365.00	PEACHTREE			
Crash Dumble & Champ	21.00	How To Use The IBM PC	45.00	SEI Programs	74.00	PEACHTREE			
Temple Of Atonia	21.00	How To Use The IBM PC W/CPM/MS	45.00	PC/AT: CAT	183.00	PEACHTREE			
Star Warrior	21.00	COMPENSATION		BIBLE		PEACHTREE			
Blueprint	42.00	PC PE	20.00	CHIEF	129.50	PEACHTREE			
Malware	42.00	PC Tutor	42.00	CIRCLE LABS		PEACHTREE			
Tycoon	42.00	COUNTERPOINT SOFTWARE		File Plan	191.00	PEACHTREE			
UNDERGROUND SOFTWARE		Early Games For Young Children	21.00	Graphical	191.00	PEACHTREE			
Die Runner	24.00	Early Games Fraction Factory	21.00	Math	191.00	PEACHTREE			
Serpentine	24.00	Early Games Chess	21.00	More Plus	191.00	PEACHTREE			
PUNTAUTIC		Early Games Peace of Cake	21.00	Starter Kit (Memo/Graph/Pr)	490.00	PEACHTREE			
Die Top	28.00	Quagion	21.00	CONTINENTAL SOFTWARE		PEACHTREE			
Cosmic Crusaders	28.00	DAVIDSON & ASSOCIATES		Home Accountant Plus	320.00	PEACHTREE			
Master Miner	28.00	Manulizer	35.00	PC/AT: CAT	183.00	PEACHTREE			
Mayday	28.00	Speed Reader II	40.00	PEACHTREE		PEACHTREE			
Surgeon II	35.00	Hit Attack	35.00	DIGITAL RESEARCH		PEACHTREE			
INPCON		DESHAWNE		CPM/MS	42.00	PEACHTREE			
Encounter	35.00	Creative Creator	29.00	Logi	255.00	PEACHTREE			
Enforcer	35.00	Crypto Caber	29.00	C Compiler	255.00	PEACHTREE			
Infidel	35.00	Math Maze	29.00	BOW JEWED		PEACHTREE			
Planetfall	35.00	Spellcrazer	29.00	Market Analyzer	163.00	PEACHTREE			
Sarcoph	35.00	Spellcrazer	29.00	Market Manager	163.00	PEACHTREE			
Starcross	35.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Suspended	35.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Winest	35.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Zork I	35.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Zork II	35.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
INNOVATIVE DESIGN SOFTWARE		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Pop	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
MICRO LAB		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Cross Mountain	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Search in the Caribbean	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Don Eggo	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
MICROSOFT		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Flight Simulator	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
COLETA		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Language	35.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
ORDIN SYSTEMS		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Covers of Callisto	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Ultima II	42.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
ORDIN SOFTWARE		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
J-Bird	29.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
PC Man	29.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Paratrooper	29.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Pat & Jones	29.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
PC SOFTWARE		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Armchair Quarterback	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Championship Backspace	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Chess 6100	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
SCAPLAY		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Professional Backspace	44.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Asylum	15.25	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
BACK CONSUMER PRODUCTS		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Buck Rogers	29.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Congo Bongo	29.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Crash	29.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Zaxxon	29.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
BIERRA		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Trooper	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Mr. Cool	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Gold Challenge	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Cross Fire	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
BIUSS SOFTWARE		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Discard Ball	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Call to Arms	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Gorgon II	24.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
WIN-TECH SOFTWARE		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Win Tech	41.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
STRATEGIC SIMULATIONS		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Battle for Normandy	31.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
The War Factor	31.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Toys To The Rescue	31.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			
OURDING		Spellcrazer	29.00	Writer	163.00	PEACHTREE			
Night Mission Patrol	30.00	Spellcrazer	29.00	Writer	163.00	PEACHTREE			

If something you would like is not listed, just call. If we don't have it, we can get it.

For Fast Delivery send cash or check, certified check or money order. Personal and company check allow 3 weeks to clear. Shipping - Software (\$2.50 minimum). C.O.D. add an additional \$1.75. Shipping - Hardware (please call). Alaska, Hawaii, Canada, P.O. APO and FPO \$5.00 minimum. Foreign orders - \$15.00 minimum and 15% of all orders over \$100. Mastercard & Visa (include card # and expiration date). Connecticut residents add 7.5% sales tax. We ship same day for most orders. Please subject to change without notice. School purchase orders accepted. All returns must have a return authorization number. Call 203-268-1850 to obtain one before returning goods for replacement.

ORDERS ONLY - TOLL FREE 7 DAYS/WK 9AM to 11PM EST 1-800-362-2242

For Inquiries and Connecticut Orders Call (203) 268-1850 CIRCLE 120 ON READER SERVICE CARD

ESI-CALCULATOR

An arithmetic calculator program with memory on/off switch, printer on/off switch, and accumulation up to 999,999,999. The program also includes allowance for up to seven decimal places and an on-screen "tape" display.

(List Price: \$15.95)

Requires: 96K RAM, one disk drive, PC-DOS.

Esi Software Inc.
110-80 Chippewa Rd.
Sherwood Pk., Alberta
Canada T8A 3Y1
(403) 467-5174

CIRCLE 791 ON READER
SERVICE CARD

B. Writer, French Version

A French translation of the *B. Writer* word processing program. The software, designed as an introductory system, includes features such as character and line insertions/deletions, block moves and deletions, automatic line centering, right margin justification, word wrap, and an on-line help screen. *B. Writer* is also equipped with print options including underlining, emphasized print, compressed print, double-wide print, as well as a facility for chaining files together during printing.

The French version was prepared by DORTEC, a Denmark software firm. Included with the program is its BASIC source code,

which permits the advanced user to alter features and customize the program to suit specific needs. A compiled version with better execution speed is also available.

(List Price: \$39)

Requires: 64K RAM (128K for compiled version), one disk drive, PC-DOS.

Automated Information Systems
1503 Ave. J, #203
Lubbock, TX 79401
(806) 762-6604

CIRCLE 786 ON READER
SERVICE CARD

Salvo Information Manager

A relational database management system that can import data directly from DIF format programs for further

manipulation using a wide range of DBMS capabilities. *Salvo* offers an English-like inquiry language for searching data files and producing on-screen or printed reports, and a separate command language for developing data file-oriented applications. While *1-2-3* maintains data lists individually, *Salvo* coordinates and concatenates reports based on those relationships. A special "view" mode can graphically depict the available data files and the ways in which they are related.

Salvo's English-like natural language inquiries are made from its "request"

mode; a typical inquiry might read "List all salespersons with their customers and any orders by amount." Alternatively, *Salvo's* separate command language permits the creation of complex program files that manipulate data files as needed for an application.

The software also offers a menu-driven mode, allowing users to choose modes with single keystrokes.

(List Price: \$495)

Requires: 128K RAM, two disk drives, PC-DOS.

Software Automation, Inc.
14333 Proton Rd.
Dallas, TX 75234
(214) 392-2802

CIRCLE 784 ON READER
SERVICE CARD



Salvo Information Manager, Software Automation, Inc.

SOFTWARE

Mailer

A standalone mailing list program for U.S. and Canadian mail. The program offers users a predefined database, label formats (1,2, or 3 across), and fill-in-the-blank screen forms. It can be used with other programs such as *dBASE II* and *WordStar*, reading in existing address files and creating ASCII files for merging into letters. Capabilities of *Mailer* include extensive sort, scan, search, address file merging, record purging, and record selection.

(List Price: \$150)

Requires: 128K RAM, one disk drive, PC-DOS.

Maurizi Associates
1344 Fitch Way
Sacramento, CA 95825
(916) 486-2993

CIRCLE 780 ON READER
SERVICE CARD

CROSSDATA

An operating system converter program that can convert data/text file disk formats from CP/M to MS/PC-DOS and back again. Two modes of operation are available to the user. The first uses function menus with explanations of commands and status line information. The second mode uses a command line format for the more experienced user. *CROSSDATA* has formatting criteria data for 30 popular 5¼-inch disk formats that can be updated.

The program features six



CROSSDATA,

Award Software, Inc.

modes for converting files on a disk:

- Selected CP/M to host DOS;
- Host DOS to selected CP/M;
- Selected CP/M to host CP/M;
- Host CP/M to selected CP/M;
- Selected CP/M to selected CP/M;
- Selected DOS to selected DOS.

The selected disk format can be any format that *CROSSDATA* has in its disk

type selection menu.

Through the use of split-screen software, both the source and destination file directories can be displayed on the screen simultaneously. Two file selection modes are included, one using the cursor for direct file selection from the on-screen directories, the other using wild-card options and/or path name commands to route files.

(List Price: \$99)

Requires: 64K, two disk drives, PC-DOS 2.0.

Award Software, Inc.
236 N. Santa Cruz Ave.
Los Gatos, CA 95030
(408) 395-2773

CIRCLE 778 ON READER
SERVICE CARD

Maintenance Master

A maintenance and facilities management program for the IBM PC/XT. The software allows the user to input facilities data, monitor equipment maintenance, coordinate equipment replacement, track labor and material costs, generate management reports, and highlight excessive maintenance costs.

Maintenance Master, written in *dBASE II*, consists of three modules: *Preventive Maintenance*; *Planning, Scheduling, and Control*; and *Inventory Control*. The software incorporates the *dBASE II* RunTime facility and can interface with *dBASE II* to provide extended reporting capabilities.

Features of the complete system include report functions and special methods of identifying and tracking each piece of equipment within a facility.

(List Price: \$1,995)

Requires: PC/XT; 256K RAM, 10 MB Hard Disk, PC-DOS 2.0.

Penton Software, Inc.
420 Lexington Ave., #2846
New York, NY 10017
(212) 878-9630

CIRCLE 774 ON READER
SERVICE CARD

SOFTWARE

Printer Graphics

A graphics print program designed for use with letter quality impact printers. The software can produce presentation quality bar graphs and pie charts with such printers as NEC, Qume, Diablo, and other impact printers with a graphics mode.

The software features a facility for reading title and data directly from Data Interchange Format (DIF) files created by a number of spreadsheet programs, including Lotus' 1-2-3 and VisiCalc.

(List Price: \$75)

Requires: 128K RAM, one disk drive, PC-DOS 2.0, letter quality printer.

Cedar Lakes Software
9235 E. Harry, #20
Wichita, KS 67207
(316) 682-3168

CIRCLE 776 ON READER
SERVICE CARD

BLAST

An asynchronous communications program providing bidirectional full-duplex operation, allowing the user to receive one file while sending another. The menu-driven program supports unattended operation, can capture text or binary files emulating asynchronous ASCII terminals, and can invoke user-defined log-on sequences with a single keystroke.

BLAST (BLocked ASynchronous Transmission) maintains noise-free

communications over phone lines, satellite links, packet-switching networks, and direct-connect local area networks. The protocol used by the software continuously interleaves unit blocks of data with check and acknowledgment blocks in



Printer Graphics, Cedar Lakes

Software

both directions, speeding transmission times. It operates through RS-232 serial ports and async modems and can work from port to port over a direct connection at speeds up to 19.2K bps. (List Price: \$250)

Requires: 64K RAM, one disk drive, PC-DOS, async modem.

Communications Research Group, Inc.
8939 Jefferson Hwy.
Baton Rouge, LA 70809
(504) 923-0888

CIRCLE 773 ON READER
SERVICE CARD

Overhead Express

A business graphics program for producing overhead transparencies and foils. The software includes four different typefaces (Modern, Script, Popular, and Classic) in both roman and italic type styles and in

sort output files. Once printed using a dot matrix printer, acetate transparencies can be produced with most common photocopiers.

The various printers supported by the software include the Epson FX/MX line, Hewlett-Packard Ink-Jet, C. Itoh, and Okidata products as well as the IBM graphics printer.

(List Price: \$195)

Requires: 192K RAM, two disk drives, PC-DOS, printer.

Business & Professional Software, Inc.
143 Binney St.
Cambridge, MA 02142
(800) DIALBPS
(617) 491-3377

CIRCLE 771 ON READER
SERVICE CARD

Keyprint

A printer configurator program for use with Epson MX, RX, and FX dot matrix printers. The menu-driven program offers over 20 options for setting the printer's operation, including double strike, compressed print, italics, and other character sets.

(List Price: \$59.95)

Requires: 64K RAM, one disk drive, PC-DOS, Epson printer.

Softkey Software Products, Inc.
2727 Walsh Ave.
Santa Clara, CA 95051
(408) 986-8148

CIRCLE 767 ON READER
SERVICE CARD

five different point sizes. Also included are international characters and graphic symbols such as arrows, brackets, check marks, and so forth.

Overhead Express provides 12 fill-in-the-blank templates to aid in the creation of a complete business presentation. These templates for generating customized pages include a title page, a bulleted list of items, a comparison chart, a table, and a budget. Presentations can be produced from existing word proces-

EZdBASE & dREPORT

Two utilities for use with the *dBASE II* database management program. *EZdBASE* is a file and screen generator capable of automatically generating *dBASE II* program and format files from screens or menus "drawn" on the screen by the user. All 256 ASCII characters supported by the IBM PC can be used in creating screens, as well as highlighting, reverse video, and underlining effects.

EZdBASE allows the user to specify up to 64 data entry fields on each screen generated by creating two data files for the application. After finishing a screen, the utility prompts the user for field names and other file structure information, then automatically generates the necessary code to create the application's format files. In addition, the utility includes a *dBASE II* command structure permitting most *dBASE II* functions to be selected from a menu.

dREPORT is a report-writing utility for *dBASE II* that can automatically draw data for a report from two separate files without joining the files. The user can generate single- or multiple-line reports with up to 40 fields from the two .DBF files. Features include support for automatic pagination and adjustable page

widths, lengths, headers, and footers. Up to nine selection criteria can be set, with eight adjustable break levels, in selecting the data to be included within a report.

(List Price: \$100 each; demo disks \$20)

Requires: 128K, two disk drives, PC-DOS, *dBASE II* Version 2.4.
Automated Office Systems
4160 Club Dr.
Atlanta, GA 30319
(404) 237-9420

CIRCLE 769 ON READER SERVICE CARD

OneShot

A data selecting and formatting program that can accept data in a wide range of forms and make it accessible to such applications as *dBASE II*, Lotus' 1-2-3, *VisiCalc*, and other programs.

OneShot can accept data from mainframes, public access systems, other microcomputers, time-sharing systems, and so on, in the form of reports, queries, or straight data files. It converts the input into the form needed by the user through the use of templates. It can accept data arriving via communications programs such as *SMARTCOM*, *PC-TALK*, *ASYNCR*, or directly in the form of disks.

The program learns to read/interpret the input data, recognizing headers, footers, delimiters, subtotals, and other data parameters.



OneShot, DataViz, Inc.

OneShot then saves whatever it has learned, translating it into a template. This simplifies the production of identical reports on a regular basis with only minor template modifications.

(List Price: \$195)

Requires: 128K RAM, one disk drive, PC-DOS.

DataViz, Inc.
P.O. Box 1319
Norwalk, CT 06856
(203) 847-7724

CIRCLE 772 ON READER SERVICE CARD

dB>MENU!

A front-end driver program for *dBASE II*, providing menus that accomplish basic tasks with a minimum of programming knowledge on

the part of the user. Instead of the standard *dBASE II* dot prompt, the user is presented with an informational screen showing the file in use, index key fields, the number of records in the file, and the current record number. Through menus, the user can CREATE, APPEND, BROWSE, EDIT, INDEX, FIND, SORT, and access other *dBASE II* command functions using single-keystroke commands. The software is expandable, providing basic routines to support the use of custom-designed *dBASE II* applications.

dB>MENU! is part of a Software Primer series that also includes two training/

reference manuals for learning *dBASE II*, Version 2.4.

dBASE II Level 1 starts a user in creating a database and continues through the creation of simple command files. The appendices at the end of the manual provide an alphabetical listing of command syntax examples, and an explanation of how to send printer control codes to a printer.

dBASE II Level 2 demonstrates the programming capabilities of the database management system with a step-by-step guide through which users write their own programs. Areas covered include the use of logical conditions, the MACRO function, and custom data entry screens. The three appendices cover ASCII character codes, the SET commands, and *dBASE II* utilities.

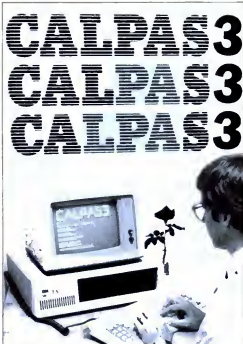
(List Price: *dB>MENU!* \$34.95; *Manuals* \$34.95 each)

Requires: 128K RAM, two disk drives, PC-DOS, *dBASE II*.
JNZ, Inc.
729 Windward Dr.
Rodeo, CA 94572
(415) 799-1446

CIRCLE 764 ON READER SERVICE CARD

Barrios E-Com System

A program allowing the user to access and transmit messages via the U.S. Postal Service's Electronic Mail (E-Com) network. The basic



CALPAS3, Berkeley Solar Group

program consists of three components: an E-Com message generation module, a print module, and the transmission module. The basic package allows the user to utilize the three types of messages accepted by the Postal Service (text insertion, common text, and single address messages). The print module can print out texts exactly as the Postal Service will and incorporates an error detection facility for verifying formatting of messages for E-Com.

The advanced version of the *Barrios E-Com System* includes the basic program, a Text Insertion Message Generator (*TIMGEN*), and an Address Formatter. These two additional modules will reformat any existing ASCII data file into a transmission file containing any number of Text Insertion Messages (*TIM*) or an address list to be used by the Postal Service for an E-Com mailing.

Both versions use full-screen menus and are set up

in a step-by-step format for preparing messages to be sent to the E-Com network. (List Price: \$395)

Requires: 128K RAM, two disk drives, PC-DOS, asynchronous communications card.
Barrios Technology, Inc.
16902 El Camino Real
Houston, TX 77058
(713) 480-1889

CIRCLE 768 ON READER SERVICE CARD

CALPAS3

A program for determining the heating and cooling requirements of houses and small commercial buildings. The IBM PC version, based upon the original mainframe software, uses a full-year hourly simulation to calculate energy performance.

CALPAS3 is certified by the California Energy Commission as complying with the California Title 24 building energy code. (List Price: \$795)

Requires: 256K RAM, two disk drives, PC-DOS, 8087 IC chip.
Berkeley Solar Group
3140 Grove St.
Berkeley, CA 94703
(415) 843-7600

CIRCLE 775 ON READER SERVICE CARD

Warehouse Master

An inventory management program for distribution warehouses. The menu-driven program enables users to sequence orders to be filled and to track the activity of

specific items in inventory. The software is written in *dBASE II*, incorporating the *RunTime* module.

The program can track items by specific lots or expiration dates, updating inventory records immediately. It incorporates ten different reports, including Consolidation, Stock Replenishing, and Warehouse Utilization.

(List Price: \$1,995)

Requires: PC/XT: 64K, 10 MB Hard Disk, PC-DOS. *Penton Software, Inc.*, 420 Lexington Ave., #2846 New York, NY 10017 (212) 878-9617

CIRCLE 777 ON READER SERVICE CARD

Medical Transcriber PCjr

A medical records reporting program for the IBM PCjr. The program, designed to work with the producers' more comprehensive diagnostic and records management systems, allows users to read, edit, and print medical records from the patient's master diagnostic file. It is intended to permit branch offices or physicians away from the office to access patient records conveniently at any time.

Medical Transcriber PCjr can work with either the producers' *Medical Office Management PCE* or *Medical Office Management PCHE* packages. It stores all diagnostic and treatment

data, permitting rapid searches of common symptoms or prescribed drug conflicts. The free-form design of the system allows doctors to make notes much as they might on a patient's chart record.

(List Price: \$249.95)

Requires: IBM PCjr: 128K RAM, one disk drive, PC-DOS 2.1, CMA medical management system, host IBM PC.

CMA Micro Computer 55722 Santa Fe Trail Yucca Valley, CA 92284 (619) 365-9718

CIRCLE 765 ON READER SERVICE CARD

Universal Accounts Receivable

A menu-driven file program for the PC-XT combining time payment, balance forward, open item, and monthly rental account types into a single system. Customer account information is accessible for inquiry or

change using either the account number or portions of the customer's name. The software automatically earns Rule of 78 interest on time payment accounts and provides for service charges optional by customer on balance forward and open item type accounts.

In addition to reports typical of each category of accounts, tax liability reports are provided for state, county, and city. The *Universal Accounts Receivable* program is designed to simplify the accounting problems encountered when a user's customer base includes clients whose tax status varies depending upon point of purchase and delivery.

(List Price: \$2,500; demo \$25)

Requires: PC-XT: 128K RAM, hard disk, PC-DOS, 132-col. printer.

Utility Computing Service, Inc., P.O. Box 4419

Monroe, LA 71211
(318) 388-0922

CIRCLE 770 ON READER SERVICE CARD

PUBLICATIONS

How To Manage Your Small Computer

A handbook for novices, exploring the most common pitfalls of owning a personal computer. Drawn from the experiences of members of the Association of Computer Users, *How To Manage Your Small Computer Without Frustration* features a workbook format with 13 sequential worksheets on potential trouble spots such as site location, supplies and accessories, safety and maintenance, and special Consumer Alerts and Case Histories.

The 246-page softcover



Warehouse Master, Penton Software, Inc.



Ash-er™

1) The only efficient way to combine the personal computer and your office telephone. The first truly integrated work station. See **PRODUCTIVE**. 2) The only system featuring single keystroke shift between phone functions and other applications programs. See **VERSATILE**. 3) Displays Phone Directory, Speedial, Calendar and Card File. Works with virtually any phone system. Including your home's. See **USEFUL**. 4) An easy-to-use format that guides you step by step through a full range of functions. See **FRIENDLY**. 5) The newest way to do something novel at a work station: Work. See **PRACTICAL**. 6) A single footprint. Eliminates desktop clutter—a single drop-in card works with the IBM PC® and other compatible systems—and your own existing applications software. See **ECONOMY**. 7) All of the above. See **ASHER**™ Call 1-800-323-1717*

ASHER consists of a printed circuit board that installs in any available option slot on the IBM PC® system board, a 5¼" diskette containing the controlling software, a handset and line cords, and user's manual. ASHER is a trademark of Wilcom, Inc., 1009 Mansell Road, Roswell, GA 30075.

IBM and IBM PC are registered trademarks of International Business Machines, Inc.

*Except in Alaska and Hawaii. In Illinois, call 1-800-942-8881.



book, designated IMC-136, is indexed and features an easy-to-follow format with important terms printed in boldface with illustrations. (List Price: \$20)

International Information Management Congress
P.O. Box 34404
Bethesda, MD 20817
(301) 983-0604

CIRCLE 763 ON READER SERVICE CARD

BASIC Programming with the IBM PCjr

A BASIC primer written especially for the novice user of the IBM PCjr. Author David C. Willen provides programming hints and sample programs the user can enter and run. As each new BASIC language concept is introduced, emphasis is placed upon its applicability for programming a wide range of applications.

A separate diskette with all BASIC programs listed in the book is also available.

(List Price: \$12.95; with disk \$24.95)
Howard W. Sams & Co., Inc.
450 Newport Center Dr., #200
Newport Beach, CA 92660
(714) 720-1824

CIRCLE 764 ON READER SERVICE CARD

SERVICES

Compu-Mail

A 24-hour electronic "mailbox" for deposit of First Class U.S. Mail. The service permits any computer-originated mail to be printed and routed into the U.S. Postal Service's general mail-stream for immediate delivery.



BASIC Programming with the IBM PCjr, Howard W. Sams & Co., Inc.

New on the Market Submission Guidelines

1. Please include the retail price, distribution methods, and details of both hardware and software requirements needed for an end-user to properly use your new product. For software especially, this includes required amount of RAM, number and type of disk drives, operating system(s) supported, and any peripheral equipment needed.
2. Releases should be typewritten double-spaced on one side of the paper. Copies of advertisements for the product may be included, but in most instances we need more information about a product than is typically included in an ad.
3. Include telephone contacts for marketing and technical questions.
4. If available, include black & white glossy photos of the product, 4 x 5 in. or larger.

Please note that all products are run on a space available basis. It is impossible to guarantee publication of a product announcement for any particular issue.

Inclusion in **New on the Market** is at the exclusive discretion of the editors.

Compu-Mail also offers the user a variety of "Electronic Greeting Cards," custom-designed messages printed with computer-generated graphics that can be ordered for any occasion. An entire year's worth of greeting cards can be sent at one time through Compu-Mail's automatic mailing option. The mailer need only send the name of the recipient, the message to be sent, and the date it is to be delivered. The service then stores the message and address data for mailing at the proper time.

For businesses needing to send out mass mailings, the service utilizes a variety of domestic and foreign databases to assemble special-

ized mailing lists for virtually any category of recipient. Mailing lists from Compu-Mail can be cross-referenced for test marketing purposes or geographic considerations.

Compu-Mail also offers clients a computer graphics creation service for creating customized forms, for such purposes as direct-response advertising, invoice and purchase order forms, survey questionnaires, and newsletters.

Compu-Mail
P.O. Box 162
Skipack, PA 19474
(215) 489-4640
(215) 489-4465 *Modems only*

CIRCLE 762 ON READER SERVICE CARD

PC BlueBook

Rates and Information

PC: BlueBook is a high-response, low-cost source for advertising in the fastest growing computer market in the world. Advertisers choose between set categories and may include a logo. Display advertisers may cross-reference to their current display ad.

Circulation: 150,000 Paid Circulation Rate Base. Readership: 300,000 Est.

AD STYLE

1 line Heading (25 characters maximum), 7 lines Body Copy (45 characters per line), 4 lines for Company name, address and telephone.

RATES

Per Issue: \$150. Additional Lines: \$15 per line. Logos: \$300 (4 issues). Minimum Order: 4 issues. Terms: Prepayment is required. Check, money order, American Express, Diners, VISA or MasterCard are accepted.

DEADLINES

August 9th for the October 16th issue, on sale September 25th. Send your ad and prepayment to: PC BlueBook, Classified Advertising, 12th Floor, One Park Avenue, New York, NY 10016. Advertising sales: (212) 503-5115. Customer service: (212) 503-4506

ACCESSORIES FURNITURE

EXECUTIVE FURNITURE

For Executive Computing. Finely finished hardwood furniture for your IBM PC. Monitor stand positions easily & lifts. Computer stand mounts system unit vertically. Each handcrafted matched set available in Oak, Cherry, or Walnut. Set \$330. MC/VISA Free brochure. Write or call PC STAND-UPS, 120 Franklin Road, Oakridge, Tenn. 37830-0367 (615) 483-6411

ACCESSORIES SUPPLIES

DISKETTES + FREE SOFTWARE

For IBM PC. ALL 10 diskettes—only \$29.95/D5! DO 3—year guarantee.

Plus:

SOFTWARE Includes

Labels, invoicing, calendar, games, IBM utilities...

—30 TOTAL

\$29.95 + \$2.00 shipping VISA/MC, check/MO

GLC SYSTEMS

2729 Winchester Pike

Columbus, Ohio 43232

(800) 332-1225, outside of Ohio (orders only)

(614) 239-1077 in Ohio

DISKS - RIBBONS - PRINTWHEELS

DISKS: MAXELL, TDK, FORMATS UNLIMITED

RIBBONS: OLIVE, DABLO, NEC, RICOH

PRINTWHEELS: OLIVE, DABLO, NEC, RICOH

VIDEDEC

Call for pricing & catalog. Dealer inquiries invited.

FORMATS UNLIMITED, INC.

Floral Park, NY 11001

(516) 488-4200 (212) 347-3200 (800) 645-8461

IT'S A JUNGLE BACK THERE

Behind every computer component lurks a tangle of wires and cables. Tame those unruly cords with SNAP-KIT. This set of wire ties, covers, and clamps, ID bands and cable routers will neatly control, label and direct your cables to their proper place. Send \$19.95 for a 40 piece set, \$29.95 for a 75 piece + \$1.50.

SNAP-KIT

Rt. 63

Westmoreland, NH 03467

RESET BUTTON FOR IBM PC

Hungup, out to never-never land, locked-up or locked out of your keyboard? No need to turn your machine off and on and wait and wait. Reboot time is about the same as ctrl-alt-del. This kit easily installs with simple step-by-step instructions. Kikits IBM PC or PC/XT. Send \$29.80 (add 6% in MN).

RESET CORPORATION

PO Box 14809

Minneapolis, Minnesota 55414

(612) 489-5892

BUSINESS OPPORTUNITIES

ENERGY MIGHT—GE TIME SHARE

Entrepreneurs needed to establish dealers and generate sales for incredible new Energy Conservation Analysis System. Includes hardware, software, and royalties from access to massive energy data base and programs on General Electric's Nationwide Timesharing System. IT'S WORTH A CALL!

GENERAL ENERGY TECHNOLOGIES

2501 17th St., #5

Costa Mesa, CA 92627

Box 2062 Newport Beach, CA 92660

(714) 645-7733

COMPATIBLES

PANASONIC S.R. PARTNERI

IBM PC compatible portable—8088 CPU, 128K memory, dual 360K drives, 9" green screen, built-in thermal printer, parallel port, serial port, RGB port. Software included: MS DOS 2.11, Wordstar, Visicalc, plus file, plus report, plus graph, G.W. basic. Send cashiers check or M.O. for \$2495 shipped. Wisconsin res. add tax—90 day warranty, all sales final.

DISCOUNT COMPUTER ACCESSORIES

445 North Pine

Reedsburg, Wisconsin 53959

(608) 524-3629

COMPUTER TRAINING

VIDEO TUTOR

How to use your PC in 10 easy video lessons "for the IBM PC and XT." An award-winning video providing assembly, keyboard, disk formatting, operating systems, software applications and an intro to BASIC. Suggested retail \$79.95 & \$3.50 s/h. in BETA and VHS. PC and several generic software titles are planned for 1984. Plus custom video & interactive videodisc training & marketing.

KENNON PUBLISHING

150 Shoreline Hwy, Bldg. E

Mill Valley, CA 94941

(800) 428-7277, (415) 332-5628 in CA

1-2-3—"VIDEO TRAINING!"

The FASTEST-EASIEST-CLEAREST 1-2-3 training on the market... in use by IBM, Exort, US Army Dept of Educ., GM, Boeing, GE & many more. SELF-PACED, PLAIN ENGLISH, HANDS-ON teaching. "Intro to 1-2-3" is a 2 hr. 23 min. videotape, disk, guidebook... extra book/disk for seminars!

LOTUS 1-2-3
VIDEO TRAINING!

LEARN-PC VIDEO SYSTEMS

3601 Woodlake Avenue South

Minneapolis, MN 55416

800-LEARN-PC (800) 532-7672

CONSULTANTS

GEORGIA

CUSTOM PROGRAMS/SUPPORT

Why have someone else's software when you can have your own? We will re-program to meet your requirements and solve your problems. Business and health care management applications a specialty. Over 15 years experience in data processing. Let 4 work for you!

YOUR SOFTWARE CO.

PO Box 2672

Norcross, GA 30091

(404) 444-1274

BLUEBOOK

DISKETTE COPY SERVICE

EACH A PERFECT ORIGINAL

Duplication and formatting for virtually all popular personal computers. Downloading 8 inch CP/M to most 5 1/4 inch CP/M. IBM EBCDIC to CP/M conversions. We are experts in IBM 154 and 25 duplication. Copy protection for IBM-PC. Downloading CP/M 8 inch or CP/M 5 1/4 inches to IBM-PC DOS or CP/M-86. Five days turn around for orders. 2 K quantity. DISCOPYLABS
1600 Wyratt Drive, Suite 10
Santa Clara, CA 95054
(408) 988-0438

ALLENBACH INDUSTRIES, INC.

Allenbach created the industry, and we've since been imitated—but never duplicated. Copies supplied on OEM quality Altachip LIFETIME GUARANTEE diskettes, now available in a variety of colors. Virtually all formats and systems. Copy protection, serialization, downloading and auditing available. Rapid delivery on 100 to 1,000,000 copies.



ALLENBACH INDUSTRIES, INC.
2101 Las Palmas, Suite A
Carlsbad, CA 92008
(602) 654-1515, (619) 436-2256

BLANKET ORDER SERVICES

Diskette duplication, packaging, stocking and drop shipping services based on your long-term needs. Place a blanket order with releases as you need them for large or small quantities at a fixed price. No extra charge for "mastering", label printing or application.
STAR-BYTE, INC.
2564 Industry Lane
Norwalk, PA 19401
(215) 539-4300

COMPUTER MEDIA PRODUCTS

SOFTWARE, DUPLICATION AND FORMATTING ON OEM quality diskettes. Copy protection, serialization, custom packaging and private labeling available. Conversion and downloading for CP/M and MS-DOS. Guaranteed fast delivery. A dealer that carries accessories and supplies. Master distributor for Verbatim, Memorex, 3M & CDC.
COMPUTER MEDIA PRODUCTS
5482 Complex Street
San Diego, CA 92123
(619) 565-7602

9 TRACK TAPE TO DISKS

Conversion from ASCII or EBCDIC 1600 BPI magnetic tape (up to 16K blocks) to most 5 1/4 inch, dual or quad diskettes. High speed automated process verifies transfer. Quality guaranteed. Only FIVE CENTS per thousand characters plus \$3 per diskette. \$50 minimum.
AUSTIN SCIENTIFIC INC.
1259 El Camino #260
Menlo Park, CA 94025
(415) 323-6338

GIVE YOUR SOFTWARE COLOR

Our color disks and color graphic disks can make your software stand apart from the rest. We offer rapid duplication in over 600 formats, including Commodore 64. We guarantee 100% verified flawless copies. Serialization, copy protection, labeling, packaging and shrink-wrapping also available.



Western Transdata, Inc.
1701 E. Eslinger Ave. Ste. A7
Santa Ana, CA 92705
Call (714) 547-3393 collect.

HARDWARE

ADD-ON BOARDS

EPROM & MP PROGRAMMER

PC compatible PROM-2000 card can program 2716, 32, 32A, 64, 128, 256, 512, 1024 EPROMs and also 8748/8751 processors. The software (CP/M-86, PLDOS) can read, verify and program eproms and uses fast programming algorithm. The zero insertion socket is mounted on an external box. The external box for 8-POL-148 pins and PHL is also available.
ADVANCED MICROCOMPUTER SYSTEMS, INC.
6602 N.W. 22nd Ave.
Ft. Lauderdale, Florida 33309
(305) 975-9515

AST/MAYNARD/QUADRAM/HAYES

AST MegaPlus (64K) \$269, Surface (64K) \$269, 120 Plus \$114, Extra Parallel, 2nd serial or game \$35, MAYNARD Card Controller \$162, Sandstar Series 8C-01, QUADRAM Quadboard \$269, Quadcolor I \$199, HERCULES card \$349. Set of nine 64K chips \$55. HAYES modems \$Call. VLM Computer Electronics
10 Park Place
Morristown, NJ 07960
(201) 267-3266

PCool™—COOLING FAN

Solves hot-related problems from expansion cards and/or hard disk. Mounts on front of PC or XT chassis, behind front bezel. Fan is not visible. Easy installation, all parts included. PCool™ retails for \$99.95 (US funds), plus shipping. Call or write for more information. Quantity discounts available.
ANALYTIC INFORMATION PROCESSING, INC. (AIP)
P.O. Box 965
Danville, CA 94526
(415) 837-2803

64K RAM EXPANSION KIT

Set of 9 factory new, tested, burned-in 150NS RAM chips suitable for use in PC/XT's work-alikes, and memory expansion boards. Satisfaction Guaranteed or money back. Static-shielded shipping. \$57.50 Set + 2.50 shipping and handling. Quantity discounts available. VISA/MC, check, M.O., C.O.D.'s for cash/cashier's check.
CORTEX INCORPORATED
603 W. 13th St., Suite 1A-263
Austin, TX 78701
(800) 237-8400 (333) (800) 262-1469 (333) x F.L.A.

MULTIGRAPH BOARD

Monochrome and color display adapter compatible with IBM PC. Monochrome graphics (LOTUS 1-2-3 compatible) with 720H x 350V resolution. Expandable options include "Soft-scroll" smooth scrolling, 132-column display, high resolution color graphics in 16 colors, and more. Price base configuration \$499.00.
PROFIT SYSTEMS, INC.
30150 Telegraph Road
Birmingham, MI 48010
(313) 647-5010

800T PC FROM HARD DISK

FIXT boots from DATAMAC, DAWSON, PEGASUS, PERCOM, GREAT LAKES, XEBEC, ZORBEK, others. Adds XT-like BIOS interface for your disk to IBM PC/XT. Ends need for installation device drivers. DOS 2.0/2.1 req'd. Plug-in installation. Specify disk/controller model with order. \$70 + \$3 shipping. (CA orders add 6% MC/VISA). GOLDEN BOW SYSTEMS
PO BOX 3039
San Diego, CA 92103
(619) 296-9349

"VOICE I/O FOR IBM PC"

Talk back to your PC! Expansion board takes voice input, stores on disk, gives high fidelity playback. Low data storage rate (1-2 kbytes/sec). Runs under PC-DOS. We provide device drivers and demo software. DIALOG I with voice I/O for \$295, DIALOG II with phone interface \$495, DIALOG III with 300 Modem \$295. Send for data sheets.



DIALOGIC CORPORATION
164 McKinley Avenue
East Hanover, NJ 07936
(201) 386-0202, (800) 221-0393

HOLDS YOUR ADD-ON BOARDS

PC Expansion Board provides 6 address slots. Ideal for adding a variety of PC add-on cards for growth. No software changes required. Simply plug in cards & connect cable to PC. Compact. Runs quietly. Easy internal access. Available w/ or w/o power supply, fan, cover, & bezel. Prices from \$309. Free data sheet.
DATAWARE DEVELOPMENT, INC.
4204 Serrano Valley Blvd. Dept. B6
San Diego, CA 92121
(619) 453-7660
(800) 362-2528

VIDEO DIGITIZER BOARDS

Our single board Octopus™-200 frame grabber transforms a standard television image into an array of 512 x 512 pixels with 128 gray levels, at the rate of 30 images per second. The Octopus™-100 produces a 512 x 512 binary image, also in real time. Prices are \$1,995 for the Octopus-200, and \$695 for the Octopus-100. U.S. Inquiries: CORECO Inc., The Computer Research Company
547 St. Thomas
Longueuil, Quebec, Canada J4H 3A7
USA: (800) 361-4997 In Canada: (514) 651-4270

ULTRA-RES GRAPHICS

HIGH-RESOLUTION graphics systems for the IBM-PC/XT. Display resolution programmable to 512x512 or 1024x1024. High speed vector/arc drawing hardware zoom, windowing, scrolling and character writing. Multiple controllers may be synchronized, software drivers included, direct drive or analog output. Prices from \$495.
C.S.O. INC.
P.O. Box 253
Sudbury, MA 01776-0253
(617) 443-2750

HARDWARE

COMMUNICATIONS

TOTAL PC&XT COMMUNICATION

ESE introduces two extremely powerful communications adapters for the PC&XT & compatibles. One is a unique multi-interrupt RS-232 serial add-on for one OR more users, \$139.95, and the second is a programmable 24 line parallel interface, \$119.45. Both have ESE's full 64K selectable I/O address decoders.

ELECTRONIC SYSTEMS ENGINEERING

477 Congress Street, Suite 911
Portland, Maine 04101
MC/VISA (207) 773-7776

HARDWARE

DISK DRIVES

SMD MICRO DISK CONTROLLERS

AND SUB SYSTEMS

Interphase brings you the most powerful disk controller and disk subsystems available for your IBM PC or PC compatible. You can use any of the dozens of high performance Disk Drives supporting the industry standard SMD interface. Capacities range from 16 to 1600 Megabytes, speeds 3-5 times the 5.25" 11mb/sec and reliable removable media too. Ideal for network file servers or large DBMS applications.
Interphase Corp.
2925 Merrell Road
Dallas, TX 75229
(214) 350-9000

BLUEBOOK

DISK DRIVES FOR PC

Qume 142A (16 Mt)	\$209
Tec FDS58 (16 Mt)	\$179
TM100-2 DS, 40T	\$209
TM100-2 DS, 40T	\$295
QD 9409 DS, 40T	\$219
MAYNARD Complete Internal 10MB Winchester Hard Drive System from \$999, WSI 9990, VISA, MC or CDD	
VLM COMPUTER ELECTRONICS	
10 Park Place	
Morristown, NJ 07960	
(201) 267-3268	

HARDWARE/ DISKETTES

SPECIAL OFFER BASF DISKS

Save savings—high quality at low prices. BASF Quaternette 5 1/4" DS/DD, \$18.00/box of 10. BASF Quaternette 5 1/4" DS/DD, \$24.00/box of 10. All quaternettes carry lifetime warranty. Shipped UPS COD. Send check (allow for clearance), M.O. or call to VISA/MC. Minimum order 2 boxes. Deriva Sales Corp.
7925 N.W. 12th St., Suite 225
Miami, FL 33126
(305) 594-4940

DISK Doubler Kit

Double your present media storage capacity and save 50% on future disk purchases. Converts FLOPPY DISK to FLUPPY in less than 1 minute. Kit comes complete with EASY TO FOLLOW INSTRUCTIONS. Use with any 5 1/4" single side disks. Pays for itself SAME DAY! KIT CDD ONLY \$19.95 vs. \$2.00 S&H M/C, VISA, MC, CDD (+\$1.85), CHECK.
MAGNETICS, INC., PO Box 98,
South Grafton, MA 01560
1-(800) 334-DISK (617) 639-4404

OMNI INTELLIGENT DISK

NOW, a flexible disk that warns you of impending failures BEFORE they happen! Patented data protection sensors warn of EXCESS HEAT & HUMIDITY. Data certified at 99%. CLIPPING LEVELS. THE HIGHEST in the industry. #W5121 SS/DD-box/10 \$39.90, #W5221 DS/DD-box/10 \$49.90, \$2.00 S&H.
M/C, VISA, MC, CDD (+\$1.85), CHECK.
MAGNETICS, INC.,
PO Box 98
SO GRAFTON, MA 01560
1-800-334-DISK (617) 639-4404

3M SCOTCH DISKS \$18.50

SS/DD 5 1/4" \$18.50 DS/DD 5 1/4" \$25.50, Ultra-magnetic bulk SS/DD \$23.50/DO, DS/DD \$39.90/DO Supercarrier \$24.25 Reel \$15 rebate. Holes—2.5mm HCT 8023 5.25" (Epson M4070) 80 \$3.85. Flip-file storage 75 capacity \$15.75. File Box 10 capacity \$1.49. Labels \$12.50/SM. Satisfaction guaranteed since 1977. CA res. add 6.5%
ARGONAUT DISTRIBUTING
1104 Buchanan Rd.
Antioch, CA 94509
(415) 778-2595

DISCOUNT DISKETTES

Dyan DS/DD \$23/10, \$24/20, \$34/100, Brown DS/DD \$26/10, \$50/20, \$225/100. Buy 20 @ 100 price until Oct. 1st. Shipping (Cont. US) \$2.00. Int'l + \$0 each additional 10. \$1.50 credit on long-distance phone orders. VISA/MC, CDD add \$2.00 per order. Ill. Res. add 6% tax. Write for price list.
SCAMP Systems, Inc.
Box 59451
Chicago, Illinois 60659
Phone # (312) 267-8658

HARDWARE PERIPHERALS

GRAPHICS ON YOUR OASIS

The only complete printer buffer family! Print and compute at the same time. Buffers from 8K to 64K bytes for either parallel or serial printers. Graphics models convert 1-2-3 and MBA graphics output into high quality dot graphics on letter quality printers. Units upgradeable to larger buffers and graphics. Proprietary double-buffering. Switch selectable hardware/software protocol. Cables and power supply included. Unique case mounts to side of PC without tools. Priced from \$229

ConvertoBuffer™

VeriLiveIndyke Enterprises
Silvermine Area
Norwalk, CT 06850 (203) 846-4979

BAR CODE READER SUBSYSTEM

Consists of Bar Code wand, Decoder unit, cable to connect to Async port on IBM PC/XT or other compatibles, and interactive SW pack & Doc. Unit reads high, med., low density Bar Codes. Bar 3B, UPL, EAN, 2 of 5, 12 of 5, Codebar, Arnes, Code 11, others. Various baud rates \$995. Dealer pricing available.
DATAFLOW TECHNOLOGIES, INC.
8422 Belona Ln., Suite 303
Towson, MD 21204
(301) 296-2632/666-2366

PRINTER/MODEM SWITCH

Fast—easy—automatic way to share a printer or modem with many PCs. No software required. RS232C or centronics. Scans for request, locks in, releases when done. LEDs show status. Channels—price \$2—\$200, 4—\$250, 6—\$300, 8—\$350. Manual switches use PC board & aluminum box. Centronics 1.2 \$99 (new), 1.4 \$179. Also RS232.
ROSE ELECTRONICS
PO Box 742571 Dept. P
Houston, TX 77274
(713) 240-ROSE

BAR CODE READERS/MAGNETIC STRIPE READERS

TPS provides Bar Code and Magnetic Stripe Readers and combinations of these for simple installation on IBM PC, PCjr, DEC Rainbow, Professional VT220 series terminals, NCR Decoder Mate V. 11 Professional, etc. They connect between the keyboard and the PC so that no card slot or programming is required. \$635-\$895.

TPS ELECTRONICS
4047 Transport Street
Palo Alto, CA 94303
(415) 656-6833

HARDWARE POWER PROTECTION

SURGE SUPPRESSORS

Protecta™ surge suppressors protect your computer from voltage spikes. Two models, each with 6 outlets, monitor light, worry case and 2 year warranty. Approx. 3.5" x 5". Components UL listed. PRO-1 plugs into wall socket, \$39.95; PRO-2 w/ meter, on/off switch, 6 cord, \$59.95. Add \$2 handling. OH res. + 5.5% tax. VISA/MC/CK.
PAXTON PRODUCTS, INC.
1101 Paxton Rd. Ste 7
Cincinnati, OH 45208
(513) 321-9400

HARDWARE STORAGE DEVICES

SRI WINCHESTER SUBSYSTEMS

Internal 10 MB hard disk for IBM PC. WESTERN DIGITAL controller. Tested & formatted, complete kit \$1050. No change in BIOS, boot from hard disk. Simple to install like a floppy. DOS 2.0. Several installed, 1 year factory warranty. Add internal 10 MB hard disk \$750. Tape back-up & removable HD systems available.

SRI DATA SYSTEMS
9 East Pleasant Avenue
Maywood, NJ 07067
(201) 684-6818

MAILING LISTS

IBM PC MAILING LIST

A plethora of sales leads... all IBM PC users. Circles or pressure sensitive labels. Zip code sort. \$80 per 1000. Also post card packs. *lifetime more than 100,000.
FOOTBALL MARKETING
PO Box 595
Tujunga, CA 91042
(213) 352-7543

IBM MAILING LISTS

Over 100,000 names of IBM personal computer owners (counts increase daily) available for rental on labels or magnetic tape. Total 600,000 including other brands.
VW BRICKNER
TARGETED MARKETING, INC.
Box 5125
Ridgewood, NJ 07451
(201) 445-7196

PUBLICATIONS CATALOGS

PC BUYERS GUIDE

THE INDEPENDENT GUIDE TO PRODUCTS AND SERVICES FOR IBM PERSONAL COMPUTERS. This master directory lists, describes, rates for sale, use, and tells you about the latest in software, hardware, accessories, supplies, books, services, etc. al. Everything for you and your IBM PC. It even includes an Index of Computer Camps for both adults and children. From the publishers of PC, an ideal gift at only \$7.95 (+ \$1.00 shipping/handling) to U.S. destinations, and \$10.00 (+ \$3.00 int'l), elsewhere. Residents of CA, CO, CT, DC, FL, IL, MA, MD, MI, NY, and VT, add applicable sales tax. Checks or MasterCard or VISA acceptable (with number, expiration date and signature). U.S. funds only. Mail to:
PC BUYERS GUIDE
PO. Box 555
Morris Plains, NJ 07950

MIS COMPANY CATALOGUE

PC—DOS, MS—DOS and CP/M—86 software for the corporate community. Complete descriptions and requirements for over 300 business packages. Find out what software Fortune companies buy. Rent \$5 for 52 page catalogue and information on corporate sales plan. We sell and support only quality software.
MANAGEMENT INFORMATION SOFTWARE COMPANY
475 Park Avenue South, 34th Floor
New York, NY 10016
(212) 686-0800

RETAILERS

HAWAII

COMPUTERLAND OF HAWAII

IBM PC and a full line of peripherals, software, and books. IBM authorized in-store and on-site service. Maintenance contracts and classes available. Call us for details.
Stadium Mall (808) 487-0030
Kawashiro Plaza (808) 521-8002
46-208 Kahupia Pl. (808) 247-4541
Kahumana Center, Maui (808) 871-9566

BLUEBOOK

SECURITY

PASSWORD CONTROL YOUR PC'S
PC LOCK II allows file by file password and encryption protection. With the lock in place, your computer will not boot without entering a correct PIN. Ideal for small multi-user environments, XT/FORTRAN wordprocessor, A 5" x 4" card with delete, 38 changeable passwords. KEEP YOUR PC STRICTLY PERSONAL.

PC Lock II™

MPPI, LTD.
2200 Lehigh Rd.
Glenview, IL 60025
(312) 998-8491

ELECTRONIC PC ALARM

New hardware security system permits movement of components but will sound an alarm when tampered with. System protects four items for less than \$200. Call or write for additional information. Dealer inquiries invited.
SE-KURE CONTROLS INC.
5685 North Lincoln Ave.
Chicago, IL 60659
(312) 728-2435

DATA PADLOCK

DATA PADLOCK is a software implementation of the National Bureau of Standard Data Encryption Standards. Written in Assembler, DATA PADLOCK offers max speed with no increase in file size. An 8 character password provides the key for encryption. Protect sensitive data, text or program files from unauthorized access. Works with all DOS versions. \$150. VISA/MC.
GLENCO ENGINEERING
3600 Ridge Ave.
Arlington Hts., IL 60004
(312) 382-2492

N-CODE™ Data Security

Fast, ultra-secure data encryption system. N-CODE protects your files from unauthorized access or change. Encrypt/decrypt a single file, entire disk. Select or change coding key when you want. Unique password and coding system supplied. Demo disk \$10. PC-DOS, 2.0/2.1/2.2/2.3/2.4/2.5/2.6/2.7/2.8/2.9/3.0/3.1/3.2/3.3/3.4/3.5/3.6/3.7/3.8/3.9/4.0/4.1/4.2/4.3/4.4/4.5/4.6/4.7/4.8/4.9/5.0/5.1/5.2/5.3/5.4/5.5/5.6/5.7/5.8/5.9/6.0/6.1/6.2/6.3/6.4/6.5/6.6/6.7/6.8/6.9/7.0/7.1/7.2/7.3/7.4/7.5/7.6/7.7/7.8/7.9/8.0/8.1/8.2/8.3/8.4/8.5/8.6/8.7/8.8/8.9/9.0/9.1/9.2/9.3/9.4/9.5/9.6/9.7/9.8/9.9/10.0/10.1/10.2/10.3/10.4/10.5/10.6/10.7/10.8/10.9/11.0/11.1/11.2/11.3/11.4/11.5/11.6/11.7/11.8/11.9/12.0/12.1/12.2/12.3/12.4/12.5/12.6/12.7/12.8/12.9/13.0/13.1/13.2/13.3/13.4/13.5/13.6/13.7/13.8/13.9/14.0/14.1/14.2/14.3/14.4/14.5/14.6/14.7/14.8/14.9/15.0/15.1/15.2/15.3/15.4/15.5/15.6/15.7/15.8/15.9/16.0/16.1/16.2/16.3/16.4/16.5/16.6/16.7/16.8/16.9/17.0/17.1/17.2/17.3/17.4/17.5/17.6/17.7/17.8/17.9/18.0/18.1/18.2/18.3/18.4/18.5/18.6/18.7/18.8/18.9/19.0/19.1/19.2/19.3/19.4/19.5/19.6/19.7/19.8/19.9/20.0/20.1/20.2/20.3/20.4/20.5/20.6/20.7/20.8/20.9/21.0/21.1/21.2/21.3/21.4/21.5/21.6/21.7/21.8/21.9/22.0/22.1/22.2/22.3/22.4/22.5/22.6/22.7/22.8/22.9/23.0/23.1/23.2/23.3/23.4/23.5/23.6/23.7/23.8/23.9/24.0/24.1/24.2/24.3/24.4/24.5/24.6/24.7/24.8/24.9/25.0/25.1/25.2/25.3/25.4/25.5/25.6/25.7/25.8/25.9/26.0/26.1/26.2/26.3/26.4/26.5/26.6/26.7/26.8/26.9/27.0/27.1/27.2/27.3/27.4/27.5/27.6/27.7/27.8/27.9/28.0/28.1/28.2/28.3/28.4/28.5/28.6/28.7/28.8/28.9/29.0/29.1/29.2/29.3/29.4/29.5/29.6/29.7/29.8/29.9/30.0/30.1/30.2/30.3/30.4/30.5/30.6/30.7/30.8/30.9/31.0/31.1/31.2/31.3/31.4/31.5/31.6/31.7/31.8/31.9/32.0/32.1/32.2/32.3/32.4/32.5/32.6/32.7/32.8/32.9/33.0/33.1/33.2/33.3/33.4/33.5/33.6/33.7/33.8/33.9/34.0/34.1/34.2/34.3/34.4/34.5/34.6/34.7/34.8/34.9/35.0/35.1/35.2/35.3/35.4/35.5/35.6/35.7/35.8/35.9/36.0/36.1/36.2/36.3/36.4/36.5/36.6/36.7/36.8/36.9/37.0/37.1/37.2/37.3/37.4/37.5/37.6/37.7/37.8/37.9/38.0/38.1/38.2/38.3/38.4/38.5/38.6/38.7/38.8/38.9/39.0/39.1/39.2/39.3/39.4/39.5/39.6/39.7/39.8/39.9/40.0/40.1/40.2/40.3/40.4/40.5/40.6/40.7/40.8/40.9/41.0/41.1/41.2/41.3/41.4/41.5/41.6/41.7/41.8/41.9/42.0/42.1/42.2/42.3/42.4/42.5/42.6/42.7/42.8/42.9/43.0/43.1/43.2/43.3/43.4/43.5/43.6/43.7/43.8/43.9/44.0/44.1/44.2/44.3/44.4/44.5/44.6/44.7/44.8/44.9/45.0/45.1/45.2/45.3/45.4/45.5/45.6/45.7/45.8/45.9/46.0/46.1/46.2/46.3/46.4/46.5/46.6/46.7/46.8/46.9/47.0/47.1/47.2/47.3/47.4/47.5/47.6/47.7/47.8/47.9/48.0/48.1/48.2/48.3/48.4/48.5/48.6/48.7/48.8/48.9/49.0/49.1/49.2/49.3/49.4/49.5/49.6/49.7/49.8/49.9/50.0/50.1/50.2/50.3/50.4/50.5/50.6/50.7/50.8/50.9/51.0/51.1/51.2/51.3/51.4/51.5/51.6/51.7/51.8/51.9/52.0/52.1/52.2/52.3/52.4/52.5/52.6/52.7/52.8/52.9/53.0/53.1/53.2/53.3/53.4/53.5/53.6/53.7/53.8/53.9/54.0/54.1/54.2/54.3/54.4/54.5/54.6/54.7/54.8/54.9/55.0/55.1/55.2/55.3/55.4/55.5/55.6/55.7/55.8/55.9/56.0/56.1/56.2/56.3/56.4/56.5/56.6/56.7/56.8/56.9/57.0/57.1/57.2/57.3/57.4/57.5/57.6/57.7/57.8/57.9/58.0/58.1/58.2/58.3/58.4/58.5/58.6/58.7/58.8/58.9/59.0/59.1/59.2/59.3/59.4/59.5/59.6/59.7/59.8/59.9/60.0/60.1/60.2/60.3/60.4/60.5/60.6/60.7/60.8/60.9/61.0/61.1/61.2/61.3/61.4/61.5/61.6/61.7/61.8/61.9/62.0/62.1/62.2/62.3/62.4/62.5/62.6/62.7/62.8/62.9/63.0/63.1/63.2/63.3/63.4/63.5/63.6/63.7/63.8/63.9/64.0/64.1/64.2/64.3/64.4/64.5/64.6/64.7/64.8/64.9/65.0/65.1/65.2/65.3/65.4/65.5/65.6/65.7/65.8/65.9/66.0/66.1/66.2/66.3/66.4/66.5/66.6/66.7/66.8/66.9/67.0/67.1/67.2/67.3/67.4/67.5/67.6/67.7/67.8/67.9/68.0/68.1/68.2/68.3/68.4/68.5/68.6/68.7/68.8/68.9/69.0/69.1/69.2/69.3/69.4/69.5/69.6/69.7/69.8/69.9/70.0/70.1/70.2/70.3/70.4/70.5/70.6/70.7/70.8/70.9/71.0/71.1/71.2/71.3/71.4/71.5/71.6/71.7/71.8/71.9/72.0/72.1/72.2/72.3/72.4/72.5/72.6/72.7/72.8/72.9/73.0/73.1/73.2/73.3/73.4/73.5/73.6/73.7/73.8/73.9/74.0/74.1/74.2/74.3/74.4/74.5/74.6/74.7/74.8/74.9/75.0/75.1/75.2/75.3/75.4/75.5/75.6/75.7/75.8/75.9/76.0/76.1/76.2/76.3/76.4/76.5/76.6/76.7/76.8/76.9/77.0/77.1/77.2/77.3/77.4/77.5/77.6/77.7/77.8/77.9/78.0/78.1/78.2/78.3/78.4/78.5/78.6/78.7/78.8/78.9/79.0/79.1/79.2/79.3/79.4/79.5/79.6/79.7/79.8/79.9/80.0/80.1/80.2/80.3/80.4/80.5/80.6/80.7/80.8/80.9/81.0/81.1/81.2/81.3/81.4/81.5/81.6/81.7/81.8/81.9/82.0/82.1/82.2/82.3/82.4/82.5/82.6/82.7/82.8/82.9/83.0/83.1/83.2/83.3/83.4/83.5/83.6/83.7/83.8/83.9/84.0/84.1/84.2/84.3/84.4/84.5/84.6/84.7/84.8/84.9/85.0/85.1/85.2/85.3/85.4/85.5/85.6/85.7/85.8/85.9/86.0/86.1/86.2/86.3/86.4/86.5/86.6/86.7/86.8/86.9/87.0/87.1/87.2/87.3/87.4/87.5/87.6/87.7/87.8/87.9/88.0/88.1/88.2/88.3/88.4/88.5/88.6/88.7/88.8/88.9/89.0/89.1/89.2/89.3/89.4/89.5/89.6/89.7/89.8/89.9/90.0/90.1/90.2/90.3/90.4/90.5/90.6/90.7/90.8/90.9/91.0/91.1/91.2/91.3/91.4/91.5/91.6/91.7/91.8/91.9/92.0/92.1/92.2/92.3/92.4/92.5/92.6/92.7/92.8/92.9/93.0/93.1/93.2/93.3/93.4/93.5/93.6/93.7/93.8/93.9/94.0/94.1/94.2/94.3/94.4/94.5/94.6/94.7/94.8/94.9/95.0/95.1/95.2/95.3/95.4/95.5/95.6/95.7/95.8/95.9/96.0/96.1/96.2/96.3/96.4/96.5/96.6/96.7/96.8/96.9/97.0/97.1/97.2/97.3/97.4/97.5/97.6/97.7/97.8/97.9/98.0/98.1/98.2/98.3/98.4/98.5/98.6/98.7/98.8/98.9/99.0/99.1/99.2/99.3/99.4/99.5/99.6/99.7/99.8/99.9/100.0/100.1/100.2/100.3/100.4/100.5/100.6/100.7/100.8/100.9/101.0/101.1/101.2/101.3/101.4/101.5/101.6/101.7/101.8/101.9/102.0/102.1/102.2/102.3/102.4/102.5/102.6/102.7/102.8/102.9/103.0/103.1/103.2/103.3/103.4/103.5/103.6/103.7/103.8/103.9/104.0/104.1/104.2/104.3/104.4/104.5/104.6/104.7/104.8/104.9/105.0/105.1/105.2/105.3/105.4/105.5/105.6/105.7/105.8/105.9/106.0/106.1/106.2/106.3/106.4/106.5/106.6/106.7/106.8/106.9/107.0/107.1/107.2/107.3/107.4/107.5/107.6/107.7/107.8/107.9/108.0/108.1/108.2/108.3/108.4/108.5/108.6/108.7/108.8/108.9/109.0/109.1/109.2/109.3/109.4/109.5/109.6/109.7/109.8/109.9/110.0/110.1/110.2/110.3/110.4/110.5/110.6/110.7/110.8/110.9/111.0/111.1/111.2/111.3/111.4/111.5/111.6/111.7/111.8/111.9/112.0/112.1/112.2/112.3/112.4/112.5/112.6/112.7/112.8/112.9/113.0/113.1/113.2/113.3/113.4/113.5/113.6/113.7/113.8/113.9/114.0/114.1/114.2/114.3/114.4/114.5/114.6/114.7/114.8/114.9/115.0/115.1/115.2/115.3/115.4/115.5/115.6/115.7/115.8/115.9/116.0/116.1/116.2/116.3/116.4/116.5/116.6/116.7/116.8/116.9/117.0/117.1/117.2/117.3/117.4/117.5/117.6/117.7/117.8/117.9/118.0/118.1/118.2/118.3/118.4/118.5/118.6/118.7/118.8/118.9/119.0/119.1/119.2/119.3/119.4/119.5/119.6/119.7/119.8/119.9/120.0/120.1/120.2/120.3/120.4/120.5/120.6/120.7/120.8/120.9/121.0/121.1/121.2/121.3/121.4/121.5/121.6/121.7/121.8/121.9/122.0/122.1/122.2/122.3/122.4/122.5/122.6/122.7/122.8/122.9/123.0/123.1/123.2/123.3/123.4/123.5/123.6/123.7/123.8/123.9/124.0/124.1/124.2/124.3/124.4/124.5/124.6/124.7/124.8/124.9/125.0/125.1/125.2/125.3/125.4/125.5/125.6/125.7/125.8/125.9/126.0/126.1/126.2/126.3/126.4/126.5/126.6/126.7/126.8/126.9/127.0/127.1/127.2/127.3/127.4/127.5/127.6/127.7/127.8/127.9/128.0/128.1/128.2/128.3/128.4/128.5/128.6/128.7/128.8/128.9/129.0/129.1/129.2/129.3/129.4/129.5/129.6/129.7/129.8/129.9/130.0/130.1/130.2/130.3/130.4/130.5/130.6/130.7/130.8/130.9/131.0/131.1/131.2/131.3/131.4/131.5/131.6/131.7/131.8/131.9/132.0/132.1/132.2/132.3/132.4/132.5/132.6/132.7/132.8/132.9/133.0/133.1/133.2/133.3/133.4/133.5/133.6/133.7/133.8/133.9/134.0/134.1/134.2/134.3/134.4/134.5/134.6/134.7/134.8/134.9/135.0/135.1/135.2/135.3/135.4/135.5/135.6/135.7/135.8/135.9/136.0/136.1/136.2/136.3/136.4/136.5/136.6/136.7/136.8/136.9/137.0/137.1/137.2/137.3/137.4/137.5/137.6/137.7/137.8/137.9/138.0/138.1/138.2/138.3/138.4/138.5/138.6/138.7/138.8/138.9/139.0/139.1/139.2/139.3/139.4/139.5/139.6/139.7/139.8/139.9/140.0/140.1/140.2/140.3/140.4/140.5/140.6/140.7/140.8/140.9/141.0/141.1/141.2/141.3/141.4/141.5/141.6/141.7/141.8/141.9/142.0/142.1/142.2/142.3/142.4/142.5/142.6/142.7/142.8/142.9/143.0/143.1/143.2/143.3/143.4/143.5/143.6/143.7/143.8/143.9/144.0/144.1/144.2/144.3/144.4/144.5/144.6/144.7/144.8/144.9/145.0/145.1/145.2/145.3/145.4/145.5/145.6/145.7/145.8/145.9/146.0/146.1/146.2/146.3/146.4/146.5/146.6/146.7/146.8/146.9/147.0/147.1/147.2/147.3/147.4/147.5/147.6/147.7/147.8/147.9/148.0/148.1/148.2/148.3/148.4/148.5/148.6/148.7/148.8/148.9/149.0/149.1/149.2/149.3/149.4/149.5/149.6/149.7/149.8/149.9/150.0/150.1/150.2/150.3/150.4/150.5/150.6/150.7/150.8/150.9/151.0/151.1/151.2/151.3/151.4/151.5/151.6/151.7/151.8/151.9/152.0/152.1/152.2/152.3/152.4/152.5/152.6/152.7/152.8/152.9/153.0/153.1/153.2/153.3/153.4/153.5/153.6/153.7/153.8/153.9/154.0/154.1/154.2/154.3/154.4/154.5/154.6/154.7/154.8/154.9/155.0/155.1/155.2/155.3/155.4/155.5/155.6/155.7/155.8/155.9/156.0/156.1/156.2/156.3/156.4/156.5/156.6/156.7/156.8/156.9/157.0/157.1/157.2/157.3/157.4/157.5/157.6/157.7/157.8/157.9/158.0/158.1/158.2/158.3/158.4/158.5/158.6/158.7/158.8/158.9/159.0/159.1/159.2/159.3/159.4/159.5/159.6/159.7/159.8/159.9/160.0/160.1/160.2/160.3/160.4/160.5/160.6/160.7/160.8/160.9/161.0/161.1/161.2/161.3/161.4/161.5/161.6/161.7/161.8/161.9/162.0/162.1/162.2/162.3/162.4/162.5/162.6/162.7/162.8/162.9/163.0/163.1/163.2/163.3/163.4/163.5/163.6/163.7/163.8/163.9/164.0/164.1/164.2/164.3/164.4/164.5/164.6/164.7/164.8/164.9/165.0/165.1/165.2/165.3/165.4/165.5/165.6/165.7/165.8/165.9/166.0/166.1/166.2/166.3/166.4/166.5/166.6/166.7/166.8/166.9/167.0/167.1/167.2/167.3/167.4/167.5/167.6/167.7/167.8/167.9/168.0/168.1/168.2/168.3/168.4/168.5/168.6/168.7/168.8/168.9/169.0/169.1/169.2/169.3/169.4/169.5/169.6/169.7/169.8/169.9/170.0/170.1/170.2/170.3/170.4/170.5/170.6/170.7/170.8/170.9/171.0/171.1/171.2/171.3/171.4/171.5/171.6/171.7/171.8/171.9/172.0/172.1/172.2/172.3/172.4/172.5/172.6/172.7/172.8/172.9/173.0/173.1/173.2/173.3/173.4/173.5/173.6/173.7/173.8/173.9/174.0/174.1/174.2/174.3/174.4/174.5/174.6/174.7/174.8/174.9/175.0/175.1/175.2/175.3/175.4/175.5/175.6/175.7/175.8/175.9/176.0/176.1/176.2/176.3/176.4/176.5/176.6/176.7/176.8/176.9/177.0/177.1/177.2/177.3/177.4/177.5/177.6/177.7/177.8/177.9/178.0/178.1/178.2/178.3/178.4/178.5/178.6/178.7/178.8/178.9/179.0/179.1/179.2/179.3/179.4/179.5/179.6/179.7/179.8/179.9/180.0/180.1/180.2/180.3/180.4/180.5/180.6/180.7/180.8/180.9/181.0/181.1/181.2/181.3/181.4/181.5/181.6/181.7/181.8/181.9/182.0/182.1/182.2/182.3/182.4/182.5/182.6/182.7/182.8/182.9/183.0/183.1/183.2/183.3/183.4/183.5/183.6/183.7/183.8/183.9/184.0/184.1/184.2/184.3/184.4/184.5/184.6/184.7/184.8/184.9/185.0/185.1/185.2/185.3/185.4/185.5/185.6/185.7/185.8/185.9/186.0/186.1/186.2/186.3/186.4/186.5/186.6/186.7/186.8/186.9/187.0/187.1/187.2/187.3/187.4/187.5/187.6/187.7/187.8/187.9/188.0/188.1/188.2/188.3/188.4/188.5/188.6/188.7/188.8/188.9/189.0/189.1/189.2/189.3/189.4/189.5/189.6/189.7/189.8/189.9/190.0/190.1/190.2/190.3/190.4/190.5/190.6/190.7/190.8/190.9/191.0/191.1/191.2/191.3/191.4/191.5/191.6/191.7/191.8/191.9/192.0/192.1/192.2/192.3/192.4/192.5/192.6/192.7/192.8/192.9/193.0/193.1/193.2/193.3/193.4/193.5/193.6/193.7/193.8/193.9/194.0/194.1/194.2/194.3/194.4/194.5/194.6/194.7/194.8/194.9/195.0/195.1/195.2/195.3/195.4/195.5/195.6/195.7/195.8/195.9/196.0/196.1/196.2/196.3/196.4/196.5/196.6/196.7/196.8/196.9/197.0/197.1/197.2/197.3/197.4/197.5/197.6/197.7/197.8/197.9/198.0/198.1/198.2/198.3/198.4/198.5/198.6/198.7/198.8/198.9/199.0/199.1/199.2/199.3/199.4/199.5/199.6/199.7/199.8/199.9/200.0/200.1/200.2/200.3/200.4/200.5/200.6/200.7/200.8/200.9/201.0/201.1/201.2/201.3/201.4/201.5/201.6/201.7/201.8/201.9/202.0/202.1/202.2/202.3/202.4/202.5/202.6/202.7/202.8/202.9/203.0/203.1/203.2/203.3/203.4/203.5/203.6/203.7/203.8/203.9/204.0/204.1/204.2/204.3/204.4/204.5/204.6/204.7/204.8/204.9/205.0/205.1/205.2/205.3/205.4/205.5/205.6/205.7/205.8/205.9/206.0/206.1/206.2/206.3/206.4/206.5/206.6/206.7/206.8/206.9/207.0/207.1/207.2/207.3/207.4/207.5/207.6/207.7/207.8/207.9/208.0/208.1/208.2/208.3/208.4/208.5/208.6/208.7/208.8/208.9/209.0/209.1/209.2/209.3/209.4/209.5/209.6/209.7/209.8/209.9/210.0/210.1/210.2/210.3/210.4/210.5/210.6/210.7/210.8/210.9/211.0/211.1/211.2/211.3/211.4/211.5/211.6/211.7/211.8/211.9/212.0/212.1/212.2/212

BLUEBOOK

PERIODIC INVENTORY/SALES

For Retailer, Wholesaler, Warehouse, Restaurant, Parts... **PERIODIC** Accounting MTD (Avg. Cost, FIFO or LIFO), Main-Frame Techniques. Full Screen, Menu & F key driven. Index Files, no Duplication! Select Fiscal Period, Year & Close out! Passwords, Utility Update, Inquiry/Print current & prior Years/Periods data. Keep Purchase Hist. Profit %s, 9 Reports: PTD, YTD, Vendor PO, Write-Off into US \$495, U.S. Inquiries. PDATA COMPUTER SYSTEMS 4312 Ontario St., Dept M Vancouver B.C., Canada V5V3G9 (604) 476-3145

SOFTWARE BUSINESS

TIME ACCOUNTING & BILLING

TABS is designed for use by professionals who bill on the basis of time (attorneys, accountants, etc.). User-friendly data entry and menu-driven program selection makes TABS easy to understand and operate. STI's full-feature software is currently in use by over 800 firms nationwide. For details contact:



SOFTWARE TECHNOLOGY, INC.
620 N. 46th, Suite 120
Lincoln, NE 68504
(402) 466-1997

THE SALES MANAGER™

THE SALES MANAGER™ is a professional management information tool for executives in sales, marketing and general business. The system is integrated and handles the tracking and reporting for Customers, Prospects, Sales Representatives, Quotas, Commissions, Planning, Forecasting expenses, Sales Analysis and Personnel. The system easily handles periodic reporting, Importing and Exporting of Files, Linked Records and Multi-levelled Security. THE SALES MANAGER™ is designed to increase sales revenue by allowing the executive control of vital sales information. THE SALES MANAGER™ is easy to use, well documented, flexible, powerful and complete. Price: \$575. MARKET POWER, INC. 1780 Rough and Ready Road Rough & Ready, CA 95975 (916) 432-1200

TIME ACCOUNTANT

TIME ACCOUNTANT is an essential time-keeping and management tool for professionals. Functions include billing preview, invoicing and reporting to professional, client, project and activity. Specially formatted pocket calendar—double sheets supplied. Requires 128K RAM, 2 drive 3.5dd disks or Winchester Telephone support. 30 day return. \$495. Time Accountant 636 Waverly St. Palo Alto, CA 94301 (415) 328-7877

THE AHA EXPERIENCE

PM5-11, Primavera, shed-spread, Harvard Project Management and Schedules Systems. For managing any complex project—R&D, construction, business planning, 200-10,000 events on critical path, bar charts, resource management—capacitantly planning & load leveling. Training also. Profits on the critical path with Aha!—the project management software specialist. AHA, INC. 109 S. River St., PO Box 8405 Santa Cruz, CA 95061-8405 (408) 458-9119

MYTE MYKE™ BUSINESS SYSTEM

COMMERCIAL GRADE INTEGRATED PKG:
• BUSINESS PACK, o/e, p/o, a/y, a/p, a/g, g/t, v/c
• MFG CTRL, Std cost, born, over rig, test-sched, mfg, exp, spc, where used, inventory control, production costing
• PROTIME: time and billing
Install and sup. avail. CP/M, PC DOS, MS DOS, UNIX & more.



MDS Associates, INC.
P.O. Box 108
Orchard Park, NY 14127
(716) 662-6611

LP88—LINEAR PROGRAMMING

A GENERAL-PURPOSE system for solving linear programs with up to 255 constraints and 255 variables. Features include menu-driven input/output, display editing, double-precision arithmetic, primal and dual solutions, sensitivity analysis, storage problems and bases re-start from a given basis, report generator. Required 128K, 1 disk drive, printer DOS. Recommended 528K, hard or electronic disc. Price: \$68 for LP88 and user's guide.

EASTERN SOFTWARE PRODUCTS, INC.
P.O. Box 15328
Alexandria, VA 22309
(703) 360-6942

MILP88—MIXED INTEGER LP

A GENERAL-PURPOSE system for solving mixed integer linear programs with up to 45 integers, 255 constraints and 1255 variables. Solves problems by applying the branch and bound method. Menu-driven with many useful features similar to LP88. Requires 128K, 1 disc-drive, printer, DOS. \$68. EASTERN SOFTWARE PRODUCTS, INC. P.O. Box 15328 Alexandria, VA 22309 (703) 360-6942

DINVOICER + PLUS

Menu-driven billing & accounts receivable management system. Produces Invoices, Aged Statements, Invoice Journals, Receipts Journals, Aged Customer Account Status, Packing lists, etc. Available with modifiable source code for dBASE II users \$129, or as a stand-alone Run-Time™ package \$199. VISA/MC. DATAMAR SYSTEMS 819 Gage Dr. San Diego, CA 92106 (619) 223-0444

TIME KEEPER (calendar)

A Calendar/scheduler featuring a weekly or monthly graphic display; multiple calendars, conference locating, copy or move apps. within or between calendars, search, tickler reminder, print selected apps., on-line help, user configuration files, plus much more. 192K PC-DOS 2.0 any printer \$195. DuraSoft 7210 Washington Ave. New Orleans, LA 70125 (504) 486-6081

USER CUSTOMIZED SOFTWARE

Complete system for setting up and running user applications to track administrative transactions. Includes file maintenance, input transactions with multiple file updates, scanning and editing, printed forms and reports. TRACKER II System \$250. Optional TRACKPAC™ Application Kits \$65. \$3 shipping.



ANALEX COMPUTING, INC.
5222 Richmond Road
Cleveland, OH 44146
(900) 336-2966

POWERFUL BUSINESS SOFTWARE

Integrated Order Entry, Invoicing, Inventory Control, Accounts Receivable, Sales Analysis. Pkg on most MS DOS Computers. Incl. history and forecasting graphs, multi-selective Mailing List module, Call Planning and Commission Statements. \$695. Complete Demo package sample data \$30. Refundable or applicable toward purchase.

DISTRIBUTED COMPUTING SYSTEMS



DISTRIBUTED COMPUTING SYSTEMS
Martha and Randolph Sts., P.O. Box 185
Lombard, IL 60148
(312) 495-0121

SAVE & ON TELEPHONE COSTS

Increase office efficiency with PHONECHECK The Telephone Manager for the IBM PC, XT and PCjr. Generates summary and detail reports necessary to allocate phone costs to departments, extensions, or to clients for bill back purposes. Discourages phone abuse. Helps determine need for WATS or Sprint® \$279. PHONECHECK, THE TELEPHONE MANAGER X100 CORPORATION (415) 571-7911 411 Bond Avenue, Suite 425 San Mateo, CA 94402

STATION MASTER

GAS STATION bookkeeping system is fully integrated. Quick, easy data entry automatically creates complete daily accounting. Reports shift check-out, TBA, profit & margins. Has full inv. control, acct's m/c, payroll, P/L, stmt., many other features. Great vertical mkt opportunity for dealers. SMALL BUSINESS COMPUTER SYSTEMS, INC. 313 Llewellyn Rd. Ambler, PA 19002 (215) 542-9639

PB.M.S.™

• PEOPLE BASE MANAGEMENT SYSTEM™
• Exceptional "people-oriented" management tool used by: professionals, marketing managers, agents, clubs, associations, charities.
• Evaluate data on donors, members, customers, prospects, clients or any group of people.
• Exclusive database program can store, select, sort, retrieve, and print information using 32 descriptive fields per person.
• Transaction function can track dollar amounts and dates in additional fields.
• Built-in word processing and merge will print: lists, labels, envelopes, letters, renewals, notices, appeals, receipts and forms.
• WordStar™ and MailMerge™ compatible.
• Flexibility and sophistication unmatched in 100% menu-driven stream line program.
• No programming required.
• List price \$475. See your dealer now or call US Inquiries. MEDIMATICS SYSTEMS LIMITED 1300 Malcolm Road Guelph, Ontario Canada N1K1B1 (519) 836-9201

ANALYTIC DESIGN MODELS

DSM is an integrative modeling system supporting multiple regression, linear/integer + quadratic programming, EGO inventory, queuing & break even modeling (all simulation based); time series, PERT/CPM. Sensitivity analysis, data management, page forward/backward & other features. \$255. Demo diskette \$15. DESIGN SYSTEM SUPPORT, INC. 31871 Via Futuro San Juan Capistrano, CA 92675 (714) 493-3639

HOTEL-2000

Hotel Management software package for IBM-PC & compatible microcomputers includes all hotel functions: Reservations, Front-Desk, Housekeeping, Guest Accounting & Night Audit. Interfaces to most G/L & A/R packages for the Back-Office. A "user-friendly" system with "menus" & messages. Requires no previous computer experience. Written in MBASIC for maximum performance. Demo files from \$25.00. System modules \$995.00 each. Dealer inquiries welcome. UNIQUE INFORMATION SYSTEMS, INC. 221 North La Salle Chicago, IL 60661 (312) 332-2820 Telex: 705071 Unique CGO UD

THE DESK ORGANIZER

Superb time management software. Sophisticated multi-functional. Have fun mastering your work load. Increase productivity. End messy desk. PC Magazine calls it a "gem... a class act." Runs alongside bestselling software. Special offer includes future enhancements, tutorial disk. Love it or return it \$249 or request free information. VISA/MC or check accepted. H TECH Box 803-BL Meno Falls, WI 53561 (414) 726-9229

BLUEBOOK

CALENDAR—SAVES TIME

FAST, graphic, effective time management. View year, month, week or day. Edit, copy, insert, delete, search and print time related information. Maintain multiple calendars on a single diskette. Store/repeat commands. Help. Requires PC-DOS 2.0, 128K, Mono or color. Send \$85 (check or M.O.) for "160Calendar".
iGourmet Enterprises Inc.
Dept. MA1
PO Box 18070
Austin, TX 78718

SOFTWARE

BUSINESS PROJECT MANAGEMENT

MicroGANTT

Control your project. You describe the work, MicroGANTT calculates the schedule and budget. Time management, resource allocation, project tracking, personnel billing and fixed cost capabilities. Flexible critical path charts. Unlimited size and scope. PC-DOS, MS-DOS, CP/M-80. Free brochure. Demo available.
EARTH DATA CORPORATION
PO Box 13169
Richmond, VA 23225
(804) 231-0300

PRIMAVERA PROJECT PLANNER™

...the most project management you can get from a micro. Plan and schedule networks of up to 10,000 activities. Level resource use. Control schedule, resources and cost. Call or write to find out why Primavera is used by managers worldwide for improved project performance.
Primavera Systems, Inc.
29 Beta Avenue
Bala Cynwyd, PA 19004
(215) 667-8600

SOFTWARE

CALCULATOR

PC-Calculator™

Transform your PC into an easy to use multi-function software calculator. Solve financial, statistical, trigonometric, and mathematical problems with ease. Also provides a Memory, Konstant, transaction and calculation printing, HELP facility, and a 50 page user guide. \$39.95 + \$2.50 shipping NY + 7% OK/COD/MC/VISA.
EVERGREEN SOFTWARE PRODUCTS, INC.
11 Redwood Court
Lancaster, NY 14086
(716) 663-4603

SOFTWARE

COMMUNICATIONS

TELEX LINK SOFTWARE

Link your computer to Western Union telex service via TWX or EasyLink. Cawthon's telex software is specially designed for telex communications and is easy to use, has on-line help, self-test diagnostics, frequently called numbers, and an excellent User's Guide. Cawthon's telex software is available for the IBM-PC and many other computers.



Cawthon Scientific Group

CAWTHON SCIENTIFIC GROUP
24224 Michigan Avenue
Dearborn, Michigan 48124
(313) 565-4000 Telex 810-221-1265

EASY TO LEARN & USE—\$95

Help for accessing public databases. DIRECT CONNECT was designed for those with little or no communications experience. Help is accessible from anywhere in the program. Manual written as Tutorial w/Disk Reference section for veterans. Xmodem protocol guarantees accurate data transfer.
IBM PC \$95



direct-aid

DIRECT AID, INC.
PO Box 4420
Boulder, CO 80306
(303) 442-0809

SOFTWARE

COMPILER

OPTIMIZING C86

C86 offers highest UNIX compatibility "portable", as fast as any of our 22 compilers. Link K&R with extras "save time", fast 6801, MSLink "integrate with MASM", library source "learn, do it your way", reliable, great text support, the most 3rd party libraries. \$395.00. Call for details.
COMPUTER INNOVATIONS
980-BB Shrewsbury Street
Trenton, NJ 07724
1-(800) 522-0169

LATICE C COMPILER

Now you can buy the finest 8086/8088 C compiler from the people who wrote it. Latest release supports 1 Mbyte addressing and PC-DOS Version 2. Single-unit price is \$500. VISA/MC accepted. Call for quantity discounts, corporate licenses, and information about other compilers and cross-compilers.
LATICE, INC.
P.O. Box 3072
Glen Ellyn, IL 60138
(312) 858-7950, TWX 910-291-2190

DeSmet C-1059

Full K & R C Compiler, assembler, linker, librarian, full-screen editor and example software. Both 8087 and floating point libraries. Rated 1st or 2nd in 8/83 BYTE Benchmarks. Newsletter. No royalties on generated code. Unlimited updates \$20/each. PC/MS DOS and CP/M-86 \$109. Now available with source level debugger. Price \$159.
C-WARE
1607 New Brunswick Ave
Sunnyvale, CA 94067
(408) 736-6905

WIZARD C COMPILER

The power of C with the thorough diagnostics of PASCAL. Full LINK diagnostics integrated with compiler. Full UNIX SYSTEM 3 compatibility. Floating point library; last compact code. 1 register variable. In-line assembly code. UNIX emulation library. Uses MICROSOFT linker. PC/MS DOS 2.0 only. \$450.00.
WIZARD SYSTEMS SOFTWARE
11 Wilbur Court
Arlington, MA 01714
(617) 641-2379

SOFTWARE

DATA MANAGEMENT

BEAST DATA MANAGER

Define your system! Format screens the way you want them! Put your 3x5 index cards onto your PC or PCjr. The BEAST can do all this, plus give you full relational retrieval to produce reports, or files to interface with the mail merge function of your word processing software. \$65. DOS 96K. Sample \$5.
STANTON SOFTWARE
PO Box 173
Stanton, NJ 08885
(201) 236-6842

APL DATA BASE UTILITIES

DOS/FILE APL data base utilities directly access DOS random files (including DBASE). Users can create own APL file based system and easily integrate own functions into DOS/FILE. GP gives random storage of functions and variables. Requires STSC APL, \$99.00/FILE, \$30.00/GP, add \$5.00/sh. APL res. add 6.5%
Enigma Research/John Lichda
4534 Vista Del Monte, #104
Sherman Oaks, CA 91403
(818) 990-8531

FORM MANAGER

COMBINES data entry, data base forms processing, and spreadsheets. Design forms on screen. Use them for data entry retrieval & calculations. Does data entry validation. Report writer sorts any 3 fields. Prints labels, reports, based on your own criteria. Handles up to 32,767 records. \$195. Demo disk-\$15.00.
BIT SOFTWARE
PO Box 619
Milpitas, CA 95035
(408) 262-1054

PC-FILE III

A "top-ten" winner (SOFTALK mag. survey) Version 2.0 (a major enhancement) includes full-screen data entry, a "browse" mode, global update & delete. Extremely fast & easy to use. Exchange data with 1-2-3, WORD, WordStar, etc. \$49/check, MC or VISA.
BatterWare
PO Box 5786
Bellevue, WA 98006
(206) 746-4296

SOFTWARE

DENTAL

DentalWare™

PROVEN Dental Management System—in use 4 yrs. Patient data management, A/R, statements, insurance forms, practice analysis, word processing, report, delinquent processing, historical data FLEXIBLE. Use designed forms, notices, statements, reports. \$360. Training included. Dealer inquiries invited.
DATA STRATEGIES, INC.
332 S. Juniper St., Suite 210
Escondido, CA 92025
(619) 493-9218

SOFTWARE

DEVELOPMENT TOOLS

CROSS-ASSEMBLERS

Use your desktop computer as a development system with Avocet assemblers—the industry standard since 1980. Available for CP/M-80, CP/M-86, and PC/DOS/MSDOS host systems, in most popular disk formats. Target chip families: 6805, 6809, 1802/05, 8048, 8051, 6502, 6800, NEC7800, F8, T8, C2P430, 8086, 286, 8296 to 8500.



AVOCET SYSTEMS, INC.
804-P South State St.
Dover, DE 19901
(800) 448-8500, (302) 734-0151

BLUEBOOK

PASCAL AND C TOOLS

TOOLS includes full string use, screen handling, graphics, & a general BIOS gate. **TOOLS2** supports all DOS 2.0 functions, including program chaining. **VIEW MANAGER** screens are printed with a Screen Painter & stored in the Screen Database. Source code is provided. **TOOLS \$125, TOOLS2 \$100, View Manager \$275.**
BLAISE COMPUTING, INC.
2034 Blake Street
Berkeley, CA 94704
(415) 540-5441

BASIC TRANSLATOR

Create Libraries of relocatable subprograms, access up to 5 Libraries simultaneously, and **CALL** modules without line numbering worries. Translator, Linker, Printer Control Facility, and Basic Lib included! Features Logic mapping, Compression, Code Evaluation, and compiler options. **FREE** brochure full package \$79.
PERSONAL SOFTWARE ASSOCIATES, INC.
PO Box 206-PC
Dorset, PA 15628
(412) 423-3200

CROSS ASSEMBLERS

The same manufacturer—compatible, relocatable cross-assemblers **Microtec** has been providing to professional developers since 1974 are available to transform your PC/MS-DOS host microcomputer into a development system. Loaders/communication utilities included. Target families: 80186, 8086, 8085, 8051, 8048, 68000, 6809, 6800, 780, 6500, others.



**MICROTEC
RESEARCH**

MICROTEC RESEARCH, INC.
PO Box 60337
Sunnyvale, CA 94088
(408) 733-2919

P P E TOOLS

Professional Programming Environment for the BASIC programmer. Structured language eliminating line #'s. Conditional macros, labeled procedures, multi-line conditionals. Reduced source file overhead. **SLP** Structured Language Processor—\$35.00. **MLP** Macro/Library Processor—\$20.00. (\$3.00 shipping).
BENDROP ASSOCIATES
PO Box 5910
Reisewick, NM 86201
(505) 347-5701

BASIC COMPILER POWER KIT

Give your compiled BASIC the DOS 2.0 functions interpretive BASIC has with the **BASIC COMPILER POWER KIT**. Over 20 subroutines let you remove, change subdirectories, search the directory, get FAT information, do string shifts & block moves, & much more. **ALL in BASIC.** A utility to strip line numbers from source code (also included). Make the most of BASIC. **\$95/USA/INC/MS/RS INC.**
111 High Ridge Road
Stamford, CT 06905
(203) 359-9655

C LIBRARY UTILITIES

Can't convert the wheel. Save time & money and do a better job developing your software. Extensive library and source. Best color/mono screen handling available. Sound, graphics, DOS 2.0 directories and files, printer, comm, date, time and more 150+ functions. General DOS/BIOS gate gives you complete control of your PC. Thorough manual & detailed examples. C86, Microsoft/Lattice (ver 1 & 2). Introductory offer \$79.
ESSENTIAL SOFTWARE, INC.
PO Box 1003
Maplewood, NJ 07040
(914) 762-6605

SOFTWARE

EDIT

KEOIT

KEOIT is an XEDIT-like full screen editor for the PC. Features include split-screen editing of multiple files, targets, ARCHAR, SCHARGE, GETFILE, SORT, paragraph reformatting, wordwrap, block operations, & key redefinition. Needs 80 column display 128K (with DOS2), \$95 (\$125 A/E). 1/21/84 plus \$3 shipping. Demo version \$10.
MANFIELD SOFTWARE GROUP
PO Box 532
Storrs, CT 06268
(203) 429-9402

SUPER SCREEN EDITOR (SSE)

A full featured screen editor including file encryption, split-screens, 4 way scrolling, user defined macro's exchange or insert, copy/move/delete blocks of data, optional auto line numbering, search/replace/undo, line backup, print utility, help screens, much more. \$99 plus \$3 shipping.
Binary Corporation
4091 125 Drive North
Royal Palm Beach, Florida 33411
(305) 790-3100

SOFTWARE

EDUCATIONAL

Lessonware

No nonsense written by NY CERTIFIED TEACHERS
Lesson Control Program
(Must buy LCP once) \$35
Rhythmic, Grade K-2 Arlene Skagla \$15
Spelling, Grade 3-6 Anne Perkins \$20
Close Reading, Grade 4-6 Alan Van Cote \$15
Instant Ailments, Adult
Leo Di Cara, MD \$15
Send check or Visa/MC number and exp. date.



THE SOFTWARE FUTURE, INC.
PO Box 60
Holbrook, NY 11761
(516) 472-1778

SOFTWARE ENGINEERING

TECHNICAL SOFTWARE

Largest selection of engineering software—CAD, Heat & Mass Flow, structural, Statistical Analysis and much more. Microcomputer programs for Mechanical, Chemical, Civil, Electrical Engineers, Architects, Scientists, Contractors. Send for detailed catalog—include \$2.00 for postage and handling.
TECHNICAL SOFTWARE INC.
3981 Lancaster Rd., #110
Cleveland, OH 44121

ENGINEERING PROGRAMS

PSI is the foremost producer of serious engineering applications for the PC. PAKS available handle chemical, mechanical, civil and power design & analysis problems. Our catalog is growing daily. Call or write for your free copy. See review PC Magazine, Nov 1983, page 567.
PSI/SYSTEMS
Research Park, PO Box 3100
Andover, MA 01810
(617) 475-9630

STATISTICAL QUALITY CONTROL PACKAGE

• XBAR-R charts • P-Charts • C-Charts • U-Charts • Cause and effect diagrams • Histograms • Basic statistics • Frequency distribution • PARETO Charts • Menu-driven • Tutorial • Complete documentation • Sample problems • High resolution graphics and printer output • Also available for Apple • SOC-Pack
CULVERIN CORPORATION
245 West Elmwood Dr
Dayton, OH 45459
(513) 425-2325 or 1 (800) 547-1565

COMPUTER-AIDED DRAFTING

AUTOCAD is 2D drafting and design enabling anyone who draws to create, edit and plot drawings. AUTOCAD is general-purpose and flexible, useful for architectural and engineering drawings of all types which previously required systems costing \$100,000. Dealer support includes training disk and manual for only \$50.
AUTOCAD, INC.
150 Shoreline Hwy #820
Mill Valley, CA 94941
(415) 331-0356

STRUCTURAL DESIGN

Quick, versatile, interactive structural programs—beams, columns & frames of any material efficiently analyzed & designed. Extremely friendly input & output with optional COLOR graphics. Specify PC configuration and send \$25 for demonstration disk to:
c²b²—software design
763 27th Avenue
San Francisco, CA 94121
(415) 751-1337

smARTWORK™

Printed-circuit artwork editor for double-sided boards up to 10" by 16"; runs on an IBM-PC. Color display allows complete interactive control over the placement and routing process. 2K artwork can be made on a dot-matrix printer or pen-and-ink plotter. \$895. Write or call for a brochure.



WINTER Corporation
1801 South Street
Lafayette, IN 47904-2993
(317) 742-6428

OPTISOVE

Optisolve solves nonlinear systems of equations and maximizes or minimizes nonlinear functions with nonlinear constraints. It has the capability to find all solutions, including complex ones. No programming language is required; the user simply inputs the problem directly in terms of symbolic equations and inequalities. No other package is as powerful. \$195.
OPTISOFT
1415 Crane Ave
Anahem, CA 92802

MuMATH™-83

White precision rational arithmetic plus automatic formula manipulation. Includes exact integration, differentiation, limits, matrices, vector calculus, infinite series, Laplace transforms and the solution of algebraic or differential equations. \$100. Also MULISP \$250.
THE SOFT WAREHOUSE
PO Box 11174
Honolulu, HI 96828-0174

SOFTWARE FILE MANAGEMENT

KWIC-REF/1

A general purpose text filing system. It is designed to file and cross reference documents, notes, letters and any text materials. It can keep track of up to 32,000 key words and 32,000 documents using "and" and "or" combinations. \$300.
CHEN INFORMATION SYSTEMS, INC.
1499 Bayshore Blvd., Suite 205
Burlington, CA 94010
(415) 692-4358

BLUEBOOK

SOFTWARE FINANCIAL

ENCORE™ DECISION SUPPORT

ENCORE is the most comprehensive business modeling, analysis, planning, reporting, and graphics decision support system available. ENCORE combines the popular features of an interactive spreadsheet with the extended capabilities of a business planning language, consolidations, goal seeking, formal reporting, financial functions, business graphics and much more. Send for 32 page brochure.

FEROX MICROSYSTEMS
1701 N. Fort Meyer Dr./8th Floor
Arlington, VA 22209
(703) 841-0800

COMMERCIAL CREDIT ANALYSIS

CLOS is a tool used by credit analysts and loan officers to help improve the quality of analysis and better quantify the lending risk. It is menu driven and generates common-sized statements, ratios, funds flow, RMA comparisons, projections, trends and graphs. Monthly and Quarterly Profit forms an projections, also available. Basic Model \$1,800; Monthly \$650; Quarterly \$950.

BAKER HILL & COMPANY
9085 E. Mineral Circle, Suite 210
Englewood, CO 80112
(303) 799-0238

CASH FLOW MANAGEMENT

LOOK takes all the what-if power of LOTUS 1-2-3™ and allows the executive to solve problems without programming his computer. It is menu driven and generates common-sized financial statements, ratios, cash flow, trend reports and graphs. Tactical and strategic planning at the focus of LOOK. Dollar and percentage variables are charged to generate proformas for 5 years or 12 months. \$950.

BAKER HILL & COMPANY
9085 E. Mineral Circle, Suite 210
Englewood, CO 80112
(303) 799-0238

INVESTMENT MASTER/PC

A sophisticated Investment Management program designed for the IBM PC, PCXT and PCAT. Track 2,000 different stocks and can be used for other investments as well. Calculates net return, profits or display reports, converts investment information for use with spreadsheets and more. Price is \$129; sample disk is \$9 (credit with purchase). Requires 64K, 1 disk drive, 80 columns display and printer.

ALDO COMPUTER SOFTWARE SERVICES
P.O. Box 927
Jackson, MI 49204
(517) 787-2204

SOFTWARE GAMES

CHECKERS

15 Create R&D & field testing has produced first class checkers game. Easy-to-learn, easy-to-play, yet loaded with menus, 30 skill levels, prompts, features/variations, great graphics! FUN FOR THE WHOLE FAMILY! Children can play, yet challenges adults, even at 10 sec/move 96K/DOS/color. 10 day money back guarantee! \$35 GRAMPS: THE CHECKERS CHAMPION

QUICKWEST SOFTWARE
P.O. Box 337
Zionsville, IN 46077

BACKGAMMON

Our popular Backgammon 1™ lets you challenge the computer to a great game of backgammon whether beginner or advanced. Game allows for several different levels of ability. Improve skills or just have fun. For IBM PC, XT, Compaq or compatible. Send \$39.95 Check, MO, VISA/MC or call for dealer near you. Requires 64K, any version DOS, 80 col. monochrome or color disp. Sears Electronics Inc.

TIMESTART
Goffstown, NH 03045
(603) 497-3074

- ChessWright™ - New for PC!

- Color & monochrome graphics, 7 skill levels
- Descriptive & Algebraic notation, or cursor
- Has large 'book' - Doesn't repeat same game
- All legal moves - Instant move takeback
- Print & review game, save & restore on disk
- Set up games or problems, play either side
- Options: clock, hint, help, & many more
- Needs 64K on DOS 1.1, 128K on 2.0 & later
- By co-author of famous Duquesne - \$50
- SoftWeight Systems**
P.O. Box 3206
Durham, NC 27705
(919) 383-4441

TRIVIAL COMPUTE™

Thousands of trivia questions categorized by sports, screen, 1 v. history, etc. Up to 6 players. PC DOS, VISA/MC, \$24.95. SOFTWARE CONNECTION, INC.
104 So. Washington
Horseshoe, IL 60521

CHESS PARTNER 2.0

This very friendly game offers ten levels of skill, dual clocks, game and problem modes, color graphics, and even allows you to take back poor mistakes! Requires 64K, a disk drive, DOS 1.1 or DOS 2.0 and a color monitor. \$24.50 (includes shipping).
SCOTT MURRAY SOFTWARE
3326 Granada Ave
Santa Clara, CA 95051
(408) 249-6188

SOFTWARE GENERAL

BAR CODE GENERATION SW

15 Create BAR CODE labels with Old 84, 92, 93, Epson X, Trintek printers. Interactive pack. Prints 39, 93, 12 of 5, 2 of 5, Codabar & UPC-A symbologies on 1-3 up label stock inc./Dec. OCR interpretation—meets LOGMAR's regms. CPM-86, PCDOCS—for IBM PC/XT, CDP MPC, other compatibles \$300. Dealer pricing available.
DATAFLOW TECHNOLOGIES, INC.
8422 Bellona Ln., Suite 303
Towson, MD 21204
(301) 296-2632/666-2386

PRINTER BASHER™

Get full menu-based operation of ALL control functions of ALL of the Epson MX, FX and RX printers with the PRINTER BASHER™. Also downloads to the FX the three COMPLETE 255-character IBM sets, including block and line graphics, Greek symbols, etc. Scores of different print styles, and a few keystrokes does it all. For the IBM-PC, Apple IIe and Epson QX-10 computers. VISA, MC, \$89.95. Free info. Dealers welcome.

**PRINTER
Basher™**

CONNECTICUT SOFTWARE

30 Wilson Avenue
Roxbury, CT 06083
203-636-1844

PC DATEBOOK/CALENDAR

Full featured Personal DATEBOOK, CALENDAR & ADDRESS LIST organizes your hectic family or business schedule. Display & prints monthly calendar with daily events and appointments. Maintains, searches and displays your address list too. Fast and easy to use. Only \$29.95. Prompt shipment. VISA, MASTER, check or C.O.D.
LATERAL PROGRAMMING, INCORPORATED
Altamonte Springs
Florida 32701-0337
(305) 788-1433

FBI CALCULATOR \$49.95

Get more use from your computer! The FBI CALCULATOR provides a full featured business and scientific calculator on your PC. Develop your own functions (save to disk) and use the 35 built in functions. Expt accumulators, function keys, tape feature and more! Requires DOS, 128K. Shipped UPS MC, VISA.
FUNCTIONAL SOFTWARE INC.
P.O. Box 237
St. Clair Shores, MI 48080
Order now! (800) 824-7888 Operator 168

PUBLIC DOMAIN SOFTWARE

Our Users Group Library can help you get more from your PC or PCXT. Choose from these software packages:

- NEW PC or PCXT USER-3-disc starter set. \$25.
 - PC SOX-PAC-5-discs containing a wide variety of useful software. \$49.
 - SAMPLER-one get acquainted disk. \$10.
- Send in your order today (please include \$2 for shipping & handling). Catalog included.
CENTRAL CALIFORNIA USERS GROUP
P.O. Box 8140
Santa Cruz, CA 95061
(408) 684-1617

DVORAK KEYBOARD SOFTWARE

Want a Dvorak Keyboard for your IBM PC? Sure-Shot Translates keyboards, gives you Dvorak Typing Coach, transfer letters for key tops, manual, self-motivation audio cassette. Works with Lotus, dBase, WordStar, etc. Stop hunting and pecking—Strike the Dvorak today! \$49.95 plus \$3.95 shipping. VISA/MC or check.
SEASONED SYSTEMS, INC.
Box 3036
Chapel Hill, NC 27515
(800) 334-5531 (919) 967-5818

BARGAIN SOFTWARE PACKAGE

An information letter, a complete address book system with many libraries, a text encoder, a birthday calculator, a banner program, several games and much more. For IBM-PC/XT. Requires: 1 disk drive, PC-DOS 2.0/2.1. User friendly. Only \$29.50 + \$1.50 shipping. CT residents please add 7.5% sales tax.
LK SOFTWARE
5 Hooker Lane
Cos Cob, CT 06807
(203) 969-6707

CHURCH ADMINISTRATION

COMPUCHURCH™ Unequaled Excellence At Low Cost. Superb Software For ALL Of Your Church Admin. Congregation Mgt. Contribution Mgt., Ledger & Word Processing. Available For Most Micros—including IBM PC, DEC Rainbow, Radio Shack II/V, Tandy 2000, Corona, Sanyo and Zenith. Hardware Available. Dealer Inquiries Invited.
MICROCOMPUTER TECHNOLOGY & SOFTWARE, INC.
312 Government Street—P.O. Box 596
Neville, Florida 32578
(904) 678-3328

LARGO SOFT INTERNATIONAL

ANGSOFT™—The Industrial/Mechanical engineering pack. HIGHCAD™—The complete high-way + construction CAD system. THERMAX™—The printed circuits board heat transfer CAD system for Mispages designers. EDP™—The complete 2 1/2" D drafting system. STARNET™—The powerful project Management system. PC-MAPICS™—Systems 34 IBM PCs compatible. SEE US AT COMDEX—BOOTH #6643.
LARGO SOFT INTERNATIONAL
Hampshire St.
Tel Aviv, Israel 64736
03-250918/250919 Telex 35301, Largo, IL.

BLUEBOOK

PUBLIC DOMAIN FREWARE

Run PC Disk Libraries for 7 days, copy yourself and return. Hundreds of business, games and utilities free for the taking!
IBM PC-SIG-(75 vols. \$75) 150 vols. \$150.00
IBM PC-BUE-(75 vols. \$75) 150 vols. \$150.00
50 "Tippy" Disks (Blank) \$99.50
Rental is for 7 days after receipt (sent by UPS).
3 more days grace to return. Credit cards accepted, no deposit necessary. \$7.50 S.H. I.
NATIONAL PUBLIC DOMAIN
SOFTWARE CENTER
1062 Taylor St.
Vista, CA 92083
(619) 727-1015, 24 hr orders, (619) 941-0925
tech info

SOFTWARE GRAPHICS

35mm SLIDE FROM YOUR PC
COMPUTER SLIDE EXPRESS converts graphic files produced on the IBM PC into brilliant 35mm color slides with color resolution 400% better than your monitor. Leave your printouts behind. Use high resolution color slides at your need presentation. COMPUTER SLIDE EXPRESS 95/ slide \$30 minimum order.
VISUAL HORIZONS
160 Metro Park
Rochester, NY 14623
(716) 424-5300

GRAPHWRITER PRESENTATION GRAPHICS

Graphwriter™ is specifically designed for your presentation graphics requirements. Chart formats include pie, bar, line, text, scatter, organization, GANTT, "bubble", table and many other special purpose chart formats. With Graphwriter you get the chart you want, the way you want it. Starting at \$395.
GRAPHIC COMMUNICATIONS, INC.
200 Fifth Ave.
Watkins, MA 02254
(617) 890-8778

HALO™

Graphics subroutines that run under MS/DOS in PASCAL, C, ASSEMBLER, FORTRAN, BASIC, and APL+. Supports color & monochrome graphics devices & can be graphics interface to applications. Lines, arcs, circles, dithering, patterns, etc. can be created. World coordinates, fonts, image compression & animation features included.
MEDIA CYBERNETICS, INC.
36 Columbia Ave.
Takoma Park, MD 20912
(301) 270-2272

PHOTOGRAPHY™

How to plot your drawings on paper or transparency. Great for overhead presentations. Make them any size, anywhere on page, either direction. Will PLOT drawings from most graphic editors. Rag IBM PC, XT or PCjr, 128K, color, 100% or 1000%, PC DOS. Only \$49.95! Call to see if we support your plotter.
CACTUS SOFTWARE, INC.
PO Box 680
Phoenix, AZ 85345
(602) 242-7953

GRAPHIC PRINTER SUPPORT

All IBM-PC graphic character support for your dot matrix printer. Use the PHSic key to produce quality scaled dot matrix reproductions of your display on your Epson, IBM, Dinkels, IDS, Centronics, DEC, Anadex, Datacube, Gemini, TI 850, Pitman, Toshiba, NEC 8023, or C. Itoh printers. If your printer is not listed, let us know and we will support it. GRAPHPLUS is now available for all versions of PC or MS-DOS and will operate with IBM and Hercules graphics boards as well as the IBM monochrome. \$49.95
JEWELL ENGINEERING TECHNOLOGY
4451-53rd Avenue Southwest
Seattle, Washington 98116
(206) 937-1081, (214) 245-7387

COMPLETE PRINTER GRAPHICS

Eliminates tedious programming hours when graphics, bar charts, or High-res graphics are desired. Produce full 132 column graphics on your IBM, EPSON, or STAR dot matrix printer. Run as a stand alone package or integrated with other software. YOU WON'T BEAT THE PRICE—\$37.50 + \$2.50 shipping.
YORKSHIRE SYSTEMS, INC.
16515 Hedgecroft, Suite 320
Houston, Texas 77060
(713) 999-1840

FORTRAN/PASCAL GRAPHICS

70 MicroSoft FORTRAN/PASCAL (3.1, 3.2), IBM (2.0) or SuperSoft FORTRAN cable subroutines. These software graphics power backed by a 100 page user manual, filled with examples and designed to be useful to every level of user. Five packages in one! General utility, 2-D interactive, 3-D plots, 3-D plots, and solid models (hidden line removal) \$135.00.
MICROCOMPATIBLES
11443 Oak Leaf Drive
Silver Spring, MD 20901
(301) 593-0683

ARCADE STYLE ANIMATION

Create video arcade style animation for store displays, cartoons, educational shows, & demos using ANIMAK. It's menu driven, easy to use, fast, and has a freedom drawing screen which, alone, is worth the full price. Many special effects. You can even add music! Up to 360 images/scene. Enhanced PCjr/8095 MSX/MSA. PAL. SOFTWARE CORP.
PO Box 39961
Los Angeles, CA 90039
(213) 259-3659

FOX-PILOT

Is menu-driven and generates line, scatter and probability charts on HP plotters or a color graphics monitor. Lines, polynomial, exponential, log and power curve fitting. Function plotting. Manual or automatic scaling, up to 9 curves with 200 points each. Requires IBM BASIC, 128K, \$200.
FOX-PILOT
1203 Highway Dr.
Wadsworth, OH 44291
(216) 336-3174

SOFTWARE HOBBIES

ASTROLOGY SOFTWARE

We have everything from high-accuracy calculation programs for professional astrologers to programs that print multiple natal, forecast, relationship and numerology interpretations for everyone. These interpretation programs include a license to sell the copyrighted text output.
AGS SOFTWARE
Box 28, Dept C
Owens, MA 02653
(617) 255-0510

STAMP COLLECTORS

The Philatelic Management System is superior software for every level of collector. Covers every aspect of collection management. Inventory Module now available and upgradeable to complete system. IBM PC, Apple IIe and II. Complete system \$295, Inventory Module \$159. Demo package \$25, credited to final purchase.
SOFTSTYLE, INC.
7152 Kalamandale Hwy., Suite 205
Huntsville, AL 35825
1-800-396-6368

SOFTWARE INSURANCE

THE AGENCY MANAGER™

Designed by insurance professionals for independent insurance agents, this integrated system performs. Customer account, general ledger, client data update and retrieval, over 100 marketing reports and sales tools, ACORD's Easy main menu and HELP feature. NANS IBM-PC, CP/M, Turbodies.
APPLIED SYSTEMS
Pauling Rd.
Morris, IL 60449
(312) 534-5575

PROPERTY/CASUALTY INSURANCE

Insurance agency automation package. Completely interactive from invoicing to P&L statements. Provides CR, CD, JE month and summaries, daily transaction reports. Basic pkg-\$1500. Other options available including on-line customer policy retrieval profile, customer one-day transactions, producer reports, & more. PC-DOS & CP/M.
Dimensional Business Systems, Inc.
250 N.W. 4th Diagonal
Boca Raton, FL 33432
(305) 368-0270
199 Bay St. 4th Fl.
Toronto, Ontario, Canada M5J1L4
(416) 367-9882

WARNING!

Your disks may be in danger! Check your blank, business and game disks. If they do not have a plastic or paper ring around the center hub, disk or data loss can occur. DISKSAFE is now offering to the public, 30 rings with applicator for only \$27.95 (15%), \$32.95 (5%). Don't lose your data! Call. Res. add 6.5% tax.
DISKSAFE
165-G Crested Lane
Carmichael, CA 95608
(408) 559-3302

SOFTWARE LANGUAGES

FORTH-32

The most complete language available for the PC. Comprehensive 420 page manual. Complete interface to DOS and BIOS, including graphics, video interface, parallel and serial ports, light pen, joystick, sound, color, DOS file access. Double screen editor. The only full FORTH 8086 Assembler. See our ad this issue.
DUEST RESEARCH, INC.
303 Williams Ave.
Huntsville, AL 35801
(800) 558-8088 or (205) 533-9405

BY50 LISP 1.10

A fast, reliable, and complete version of integral LISP 1.5 for the IBM PC/XT. Extends include a full screen editor, port I/O, file calls, BIOS. Memory access & clear tutorial book. Price: \$195.
LEVEN INSTRUMENT CO.
Box 31
McDonald, VA 24458
(703) 396-3345

SOFTWARE LEGAL

LAWSEARCH-WESTLAW

Access the WESTLAW legal database using an IBM PC/PC-XT or compatible. Certified and recommended by West Publishing Co. for their WESTLAW subscribers using PCA. Easy to learn & use. Log-on automatically w/one keystroke. Save information to disk or printer. Convert files for use with most wordprocessors. \$350.



direct-aid

DIRECT AID, INC.
PO Box 4420
Boulder, CO 80305
(303) 442-8060

BLUEBOOK

SOFTWARE

MAILING PROGRAM

INHERIVISION'S MAILER

A database of names, addresses, and many other vital statistics make a powerful mailing system for your PC/XT/yr. The program is menu-driven; it prints mailing labels, form letters, telephone directories, and master listings. Functions include full screen editing, 15 way query with ADO & SUBSET, 17 way sorting, dynamic printer control, and printed formatting. Req. 1 disk, 128K, DOS, \$60 + \$4 shipping. INHERIVISION MICROSYSTEMS, INC. P.O. Box 3427 Silver Spring, MD 20901 (301) 445-2493

MY-T-MAILER™

Our users love it! Our menu-driven program will print 1 to 5000 copies of a label or print mailing lists. See 30 labels onscreen simul. → unlimited cross-sort. Customers labels with line-by-line printer labels (use RAM disks or hard disks). Req. 128K, DOS, parallel port, 80 cpi. Only \$300 ("Labelmaster" users may upgrade for \$25). Value! JOHNSON SOFTWARE COMPANY, Suite 155 420 Pier Avenue Hermosa Beach, CA 90254

PONY EXPRESS

Prints on labels 1 to 5 across or master list print-out on 80 or 132 character wide paper. Also CHESHIRE FORMAT Super set 4 way sort. Unlimited files. Multi-file merge. Record selection by unlimited user selection codes. Includes phone list options. Correction and deletion routines for updating. Auto-repeat for ease of record entry. \$169. COMPUTECH 975 Forest Ave. Lakewood, NJ 08701 (201) 364-3005

SOFTWARE

MANUFACTURING

QUALITY CONTROL

QUALITY ALERT™—Diagnose and correct quality problems with these descriptive statistics • Histograms • Control Charts • Process Capability • Variable/Attribute Data Samples • Graphical & Printable Output • User Friendly • Menu-driven • Complete Documentation • Support • Apple, IBM PC & XT compatible. Money back guarantee. \$795.00. PENTON SOFTWARE, INC. 420 Lexington Ave./Suite 2846 NY, NY 10017 (212) 678-9600, 1-800-221-3414

MCBA MANUFACTURING SYSTEM

Adapted for the IBM PC using MS-DOS. Inventory Management, Bill of Materials, Order Processing, Purchasing, Job Costing, MRP, Labor Performance, Shop Floor Control, Standard Product, Costing and Routing, Accounting. In-stock & support available. In use at over 11,000 installations!! MDI Systems, Inc. 5701 Chicago Rd., Suite C Warren, MI 48092 (313) 979-7030

MYTE MYKE™ MANUFACTURING

CONTROL SYSTEM integrates with BUSINESS SYST & features mainframe capabilities STD COST ... bill of material and operations routing provide where used, same as except, & projection capabilities. FORECAST/SCHED, MRP, MPP, Production costing, SHOP FLOOR CTRL, Install & support/avail CP/M, IBM PC, MS DOS, UNIX & more



MS ASSOCIATES, INC. P.O. Box 108 Orchard Park, NY 14127 (716) 662-6621

SOFTWARE MEDICAL

POS/1™ VERSION 4.0

MEDICAL BILLING & A/R. Statements & Ins. forms. Aging & revenue analysis with bar graphs. Multiple doctors, practices, insurances. Day sheets, recall notices, referring physicians, audit trails, ledger details. Online update & access by acct. #/name. Customizable procedure & Dr. codes; menu-driven, help screens. PC-DOS, 128K, hard disk, \$2200. CHEN INFORMATION SYSTEMS, INC. 1499 Bayshore Hwy. Suite 205 Burlingame, CA 94010 (415) 692-4358

THRESHOLD

120 programs for A/R, office management, clinical studies, referring physician reports, electronic claims submission. Includes on-line help, full security with audit trails, patient name orientation, \$5,500. FREE REMOTE DEMONSTRATIONS AVAILABLE. Requires hard disk, 256K, COMOL, run time, PC-DOS. PHYSICIANS PRACTICE MANAGEMENT, INC. 1610 South Lynnhurst Drive, Suite D Indianapolis, Indiana 46241 In the continental U.S. call (800) 428-3515 Indiana residents call (800) 792-3525

AUTOMATED PRESCRIPTIONS

RWRITER is a sophisticated program that
• Produces legible prescriptions
• Prints up to 20 prescriptions at a time
• Is flexible and fast
• Keeps a record on disk of diagnosis and all prescriptions written.
is only \$100 with 40 page manual
HALL DESIGN, INC. 250 Maple Avenue Wilmette, IL 60091

DIFFERENTIAL DIAGNOSIS

The INTERNIST program runs differential diagnoses on any combination of 480 symptoms for 331 diseases. Lists symptoms associated with any disease. Privits and displays diagnoses in rank order. Extremely easy to use and fast. Includes binder, user-manual, program and data base databases. 128K RAM required (64K version available) \$95.00. VISA, MC, check, or UPS C.O.D. accepted.

N-Sequared Computing 5318 Forest Ridge Rd. Silverton, OR 97131 (503) 873-5906

DRs/MANAGEMENT: A joy!

Quite simply the difference is ease of use, an intuitive logical flow which lists the needs of an active practice. Designed by a practicing physician, we have all the billing, mgmt, AR, scheduling, recall, & search features you'd expect. PLUS full PDM, graphics & much more. Simply the best! Try it and be convinced! DEMO for PC, XT or compatible with full manual only \$39. VISA/MC/COD. MEDSOFT of California, Inc. 11772 Serrano Valley Road, Suite 101 San Diego, CA 92121 (619) 258-8282

Compumed™

PROVEN Medical Management System—in use 3 yrs. Patient data management, A/R, statements, insurance forms, practice analysis, word processing. Options—Split Aging By Doctor, Laboratory, Canadian, Industrial medicine, electronic claim processing. Training included. XT \$3600. Dealer inquiries invited. DATA STRATEGIES, INC. 332 S. Juniper St., Suite 210 Escondido, CA 92025 (619) 498-9218

FREE OEMO DISKETTE!

Turn your computer into a valuable ally in achieving perfect fitness and permanent weight control. Order demo diskette for only \$6.00 and deduct this from the purchase price of \$69.95 when ordering the Master Control Diet and Exercise Program. PCjr version now available (128K, 80 column monitor).



HEALTHWARE 2300 Round Rock Avenue, Suite 209 Round Rock, Texas 78664 (512) 244-3378

SOFTWARE/One-of-a-kind

RAM DISK II

RAM DISK II is a HBK RAMDISK and comes with a PRINT SPOOLER runs on IBMPC compatible systems, AND WORKS EXACTLY LIKE ANOTHER DRIVE. Instantaneous loading of programs! NO hardware, NO commands, 100% software! Self-initializes at bootup. Searches ALL boards for memory. Only \$59.95 for the Ram Disk & Print Spooler.



RENSIS COMMUNICATIONS P.O. Box 414 College Park, Maryland 20740 (202) 728-7955

SOFTWARE OPERATING SYSTEMS

MULTI-USER XT SOLUTION

With GMS-16 operating system, run 3 users on an IBM PC/XT using all IBM components. Each user may run different programs, or files can be accessed simultaneously by all users with security & data integrity. Share printers. Run proven basic business applications and/or develop your own BASIC programs \$795. PHASE ONE SYSTEMS, INC. 7700 Edgewater Dr., Ste. 830 Oakland, CA 94621 (415) 562-8065. TOLL 910-366-7139

MULTIPLE USERS UNDER PC DOS

MultiLink turns PC-DOS into an efficient multi-user multi-tasking operating system. Additional users are supported by attaching inexpensive CRT terminals or modems to serial ports on the PC, and can run normal applications designed for PC-DOS. Includes novel communications software for public disk-in. THE SOFTWARE LINK INCORPORATED 6700 28th Rowland Rd. Atlanta, GA 30328 (404) 255-1254

TASCMASTER SOFTWARE

Multi-Tasking IBM-PC, or IBM-PC-XT. Operating under PC-DOS, allows up to 16 tasks to be run concurrently in background mode unattended. Can work in Wordstar, do a calculation from Lotus 1-2-3, monitor modem, database sort and month-end closing from Accounting Program all at once. Price \$475 including Addram Plus or Addram Elite multifunction board. PROFIT SYSTEMS, INC. 30150 Telegraph Road Birmingham, MI 48010 (313) 647-5013

BLUEBOOK

SOFTWARE

PREVENTIVE MAINTENANCE

DISKETTE DRIVE ALIGNMENT

READSCOPE is a comprehensive diagnostic program that analyzes the status of a diskette drive. Fast, 1 minute checkout. Drives can be tested without removal. Adjustments to head, speed and spindle hub alignment can be made without special tools or skills. Comes complete with special diagnostic disk. \$295

ReadWare Systems, Inc.
PO Box 680-N
West Redding, CT 06896
(203) 431-3521

SOFTWARE

REAL ESTATE

PROPERTY MANAGEMENT PLUS

A new easy-to-use system for single or multi-family properties. Prints checks, rent statements and receipts. Reports—late rents, expired leases, vacancies, income/expenses, and operating statements. Includes a bank reconciliation feature and graphics capabilities! Up to 70% reduction in management time. \$525. REALTY SOFTWARE COMPANY
1925 South Pacific Coast Hwy, #229
Redondo Beach, CA 90277
(312) 372-9419

REAL ESTATE TOOLS I

Over 45 powerful, easy-to-use, menu-driven analyses of mortgages (regular, balloon, GPM, constant principal, wrap), leases, construct. Loans and variable/grouped cash flows plus amortizations. Computes IRR, NPV, FMR, price, points, yield, etc. For IBM PC/XT/compatibles, 128K, 2.05 drives. 228-page manual. \$299. ANSHAW SOFTWARE INC.
2801 N. Sunrise Drive
Camellito, Texas 75066
(214) 445-4340

SUPER EASY—"REALPAC"

Professional Investment Analysis in minutes, without computer training. Full screen editing. Calculates Income, Cash Flows, IRR's & Depreciation, tax shelter and MORE. Prints very easy-to-read reports. Also includes an easy, but sophisticated Amort. Sched.'s, IRR & Dep. Calculators, FULL Manual—Price \$275. CREATIVE BUSINESS COMPUTER SYSTEMS, INC.
8731 Red Road
Cora Gables, FL 33143
(305) 666-7970

EZ-RE INVESTOR TEMPLATES

Complete analysis package for the Real Estate Investor. For Equity Share, Rent House, Apartments, Warehouses, and Office Buildings. Five mortgages can be ARM, FHLMC, amort., deferred int. or int only. Ten-year projection of cash flow, deductions, sell price, tax at sell, gain or loss per year, and after tax IRR. Expenses, int. rent, and appreciation adjust annually. Also 45 year loan amortization template. Profit report. Requires LOTUS 123 and 256K. \$50 PPD. Money back guarantee. Visa, MC. L.B. ASSOCIATES, INC.
8817 Shaker Lane
Vienna, VA 22183
(703) 938-8093

REAL ESTATE CONSULTANT

A sophisticated real analysis package designed to make investment decisions easy. Features Amortization and Depreciation schedules, VIBs, Balloons, and Known Loan Payments. This package handles up to eight mortgages with wraps, syndications, partnerships and individuals, investment tax credits. \$275.00 Dealer inquiries welcome. CONSULTANT SYSTEMS, INC.
3704 State Street, Suite 311
Santa Barbara, CA 93105
(805) 682-8827

SOFTWARE

SECURITY

PUBLIC KEY ENCRYPTION

The ultimate security for your data, on disk or during transmission. Dataarmor's Public Key Encryption system permits you to choose your level of security, eliminates the key security problems of point to point encryption schemes. Ideal for business to business or business to government communication. List Price: \$199.00 (Canada \$249.00). DATAMORPHICS LTD.
PO Box 520, Sault Ste. Marie,
Ontario, Canada N0A 3G0
(613) 836-3270

BIT-LOCK® SECURITY

Guard your valuable software from PIRACY. Our inexpensive security system protects you from lost profits. Copies will only operate with a BIT-LOCK device attached. BIT-LOCK's powerful multi-layered security has proven its effectiveness on IBM PC/XT, AT/386, Apple and Commodore computers thru the test of time. MICROCOMPUTER APPLICATIONS
7805 So. Windermere Circle
Lifton, CO 80120
(303) 922-6410

IBM PC DATA ENCRYPTION

PROTECT your confidential WP—Spreadsheet—Database—Communication—Source Code—Basic—EXE & COM files FAST—500 BULLION Passwords! New PC-DOS 1.1/2.0/2.1 program—A must for PC & XT systems. EASY TO USE! Hide built-in Copyable! Affordable security—\$39.95 ppd. Free Info-Mail Check/M.O. to: D.A. RITANI & ASSOCIATES
PO Box 65771
St. Paul, Minnesota 55165

IBM PC DATA SECURITY

WATCHDOG® security system provides access control and data encryption protection for information stored on IBM PC/XT/IBM PC with add-on disk. Data may be partitioned into secure units. Menu screens ease selection of programs and files. Audit trail reports usage. \$295 each. Quantity discounts. FISCHER-INMIS SYSTEMS CORPORATION
4175 Merchante Ave.
Naples, FL 33942
(800) 237-4510 Toll Free/
(813) 793-1500 (In Florida)

SOFTWARE

SORT

OPT-TECH SORT/MERGE

Extremely fast Sort/Merge program for the IBM-PC. Can sort or merge multiple files containing fixed or variable length records. Run as a DOS command or call as a subroutine, plus many other features. How also sorts dBASE II files! Compare before you buy any other. Write or call for more info. \$99. OPT-TECH DATA PROCESSING
PO Box 2167
Humble, TX 77347
(713) 454-7428

PERSONAL COMPUTER SORT

Fast, easy-to-use sort program for your IBM PC. Can sort your text files on multiple fields in either ascending or descending order. Handles fixed or variable length records. Clear concise menus make it easy to understand and operate. \$50. ThoughtSoft
PO Box 3112
Cincinnati, OH 45201
(513) 221-7539

INTERNAL SORT FOR BASIC

ISORT—A FAST & easy to use quicksort subroutine written in C & assembler. CALLable from BASIC. Sorts an unlimited number of records in memory on up to 8 keys of mixed type, ascending/descending. Like having a SORT built into the language. Works w/ compatibles. Compiled & interpreted, all DOS versions. \$49.95-\$25.50. s&h MC/VISA/CHECK PA. +6% tax. NATIONAL SOFTWARES
65 East Elizabeth Avenue
Bethlehem, PA 18018
(215) 961-4800

SOFTWARE

STATISTICS

SIGSTAT

SIGSTAT includes over 30 programs of the BMD statistical series, plus many advanced new features. Mainframe capacity (up to 80 var.) for uni- (e.g., ANOVA, regression) + multivariate (e.g., canonical, factor) analyses, time-series, cross-tab, plots, and much more. \$897 support opt. 128K, DOS, \$395. SIGNIFICANT STATISTICS
3336 N. Canyon Road
Provo, UT 84604
(801) 377-4860

NWA STATPAK

Powerful data manipulation utilities, ASCII data structure for interface to databases, word processors, etc. Statistical functions include probability, descriptive statistics, regression and correlation, non-parametrics, distribution functions, means testing, survey data analyses, & ANOVA. \$495. NORTHWEST ANALYTICAL, INC.
1532 Morrison St.
Portland, OR 97205
(503) 224-7727

MSUSAT

40 procedures—Multiple regression, analysis of variance & covariance, multiple & contrast comparisons, non-parametrics, attribute data analyses, t-test, random data generation. Simplicity, but with features for professionals. A fast compiled FORTRAN ready-to-run package for MS/PC-DOS with 128K & CP/M-80. With \$4K (\$505). THE RESEARCH AND DEVELOPMENT INSTITUTE, INC.
Montana State Univ. Bldg. R.E. Lund
Bozeman, MT 59717-0002
(406) 994-3271

SOFTWARE

STOCK ANALYSIS

STOCK MANAGER

A sophisticated system that offers you an easy & economical way to keep your investment portfolio current. Keeps over 25 items of information on over 400 stocks. Produces several reports including current value of the portfolio. Easy to follow menus. \$150. Send or call for our complete catalogue. DMMI SOFTWARE SYSTEMS, INC.
146 North Broad Street
Griffin, IN 46319
(219) 924-3522

WALL STREET WINDOW

- Integrated stock pack with extensive TECHNICAL ANALYSIS—moving avar., stock comparisons, trendlines, relative strengths & more.
- Detail in-line GRAPHICS, avail. in four COLORS using COLORPLUS board.
- SPREADSHEET interface for portfolio updating.
- AUTOMATIC access to DOW JONES, historical & current quotes.
- AUTOLINK using saved keystrokes, \$395. DEMO-avail. RUSSELL SOFTWARE ASSOCIATES
PO Box 2727
Reslin, VA 22090
(703) 478-6597, 950-1008 (pause) 800-123

BLUEBOOK

SOFTWARE

TAXES

PARTNERSHIP TAX ANALYSIS

Unique partnership tax planning and analysis program. Save millions for your own or your client's partnership. Program menus allow the evaluation of all planned partnership action for tax implications. System gives you alternative and backs each one up with court decisions, rulings, regs and opinions. Stand-alone, Runtime: \$2,495.

STRAT ANALYTICAL SYSTEMS, INC.
P.O. Box 42825 Suite 350
Houston, TX 77242
(800) 635-2246 ext. 99 In Kansas (800) 362-2421 ext. 99

SOFTWARE

TERMINAL EMULATION

BURROUGHS HANDSHAKE

ALL-ASCII SOFTWARE Burroughs M19 63/10 830 terminal emulator. HANDSHAKE allows PC or compatible microcomputer to communicate with existing Burroughs host programs. Also transfers files between the host and microcomputer disk storage connecting with dialogue. Installed worldwide.

SOFTWARE CLEARING HOUSE
771 Niles Road
Cincinnati, OH 45238
(513) 451-6742 Telex 24-1665

HASP IBM 360/20 EMULATOR

BARR/HASP simultaneously transmits jobs and receives printouts directly IBM's MVS/JES, VM/ RSCS bypassing TSO and CMS. Emulates HASP or 360/20 and is compatible with all HASP multitasking protocols. Features: Menu-driven operation, multiple printers, 1000 lines per minute, 1200 to 18,200 baud, self-testing, loop-back mode, easy installation, free customer support and more. BARR/HASP is field proven and delivered with a one-year warranty. Total cost of software, synchronous adapter board and documentation—\$690. Manual only \$14.50. Call for trial evaluation.



BARR SYSTEMS, INC.

2500 Blue Ridge Road Suite 315/Neenah, WI 54957

BARR SYSTEMS, INC.
2500 Blue Ridge Road, Suite 315
Neenah, WI 54957
800-BARR-SYS

BLUE LYNX

Let your IBM/PC or XT replace your dumb terminals. The BLUE LYNX hardware board with associated software emulates the 5251/112 for the S/34, S/36, & S/38 as well as the 3278 for the larger 43XX and 43XX mainframes, both bi-synch and SDC versions. TECHLAND specializes in communications. BLUE LYNX is only \$690. TECHLAND SYSTEMS, INC.
25 Waterside Plaza
New York, NY 10010
(212) 684-7788

SOFTWARE TRAINING

THE AUTHOR & AUTHOR PLUS

THE AUTHOR+ is a flexible, reliable, COM-PUTER AUTHORIZING SYSTEM. Its ease of use, automatic branching, complete record keeping & thorough documentation make it a proven winner. THE AUTHOR PLUS+ combines all of these features with GRAPHICS, expanded use of function keys, and full screen editing & entry. RAPTOR SYSTEMS, INC.
324 South Main Street
Stillwater, MN 55062
Formerly—PHENIX PERFORMANCE SYSTEMS
(612) 430-2960

SOFTWARE TYPESETTING

HIGH-TECH TYPESETTING

Our fully automated facility allows us to offer the fastest turnaround time and lowest prices. Transmissions received by 1:00 pm EST are sent out the same day. Cost is a low \$2/thousand characters with a \$5 minimum per job. Transmittal toll-free 24 hours/day. 200 typesetters available including "printout." Hyphenation & justification program available. Call for \$50. Major credit cards accepted. Call for free brochure. Comprehensive manual available \$10.

INTERGRAPH, INC.
106 A South Columbus Street
Alexandria, VA 22314
(800) 368-3342, (703) 683-9414 in D.C. area

SOFTWARE UTILITIES

SYMBOLIC DEBUGGING

MyStar SD Program enhances the IBM DEBUG Program using the same command structure. Use symbol names, mathematical expressions, Batch Files, on-line help, multi-command macros, and loop structures. Makes your job easier, for PC-DOS 1.1, 2.0, 2.1 128K RAM minimum. \$125.00 check, money order, MC or VISA. MYSTAR ELECTRONICS, INC.
165 West Lake Street Dept. 120
North Lake, IL 60164
(312) 562-7400

COPY PROTECTION BY MSD

THE ULTIMATE diskette copy protection system designed for software developers and publishers. A variety of protection methods are available to suit your protection requirements. All IBM PC and XT environments are supported which includes DOS, BASIC (compiled and interpreted), Pascal, P-System, dBASE II and stand-alone systems. Customized systems also available. Requires 64K, two disk drives.



MICRO-SOFTWARE DEVELOPERS, INC.
214th West Main Street
St. Charles, Illinois 60174
(312) 377-5151

KNOW THY PCI

THE INSIDE TRACK gives your programs speed and control. Read files as fast as DOS, display data faster, load programs faster, control memory use, run any program from your program, copy-protect your disks, and much more. Fold-out memory map tool. Disk (\$1 programs) & manual \$45.

• The popular PEKS 'N' POKES shows you how to access and modify the status of the PC. Perform DOS and BIOS function calls from BASIC or Pascal/Learn how to find more Peaks 'N' Pokes and much more. Disk (\$5 programs) & manual \$30. Shipping—\$2.50 (over MC/VISA). DATA BASE DECISIONS
14 Remmie Lane
Atlanta, GA 30328
(404) 256-3860

BASICWINDOW

Screen Generator and Processor for BASIC programs. This package combines a Screen Painter for creating and modifying screens and Macro Language and Compiler for quicker coding and testing. Features COLOR, field variables, complete input editing, line drawing. For BASIC, BASICA, and BASIC Compiler users. Includes manual and reference card. \$99.95 VISA/MC accepted.

BasicWindow™

G. FREEMAN & COMPANY, INC.
15 Allen Road
Stamford, CT 06902
(203) 327-9868

THE SCREEN GENERATOR v. 3.0

If you can't display a FULL COLOR data entry screen with up to 250 values and process it! In: Add, Update, Delete or query PLUS THAN TEN Basic or Assembly statements, then YOU need the NEW SCREEN GENERATOR v. 3.0. Total screen management and data entry processing for the Novice to the Professional. \$125.
K-S SYSTEMS
P.O. Box 643
Owensville, IN 46787
(219) 449-2754

SYMBOLIC DEBUGGER

SYMD simplifies debugging by utilizing your source code symbols and line numbers. SYMD also lets you: Examine/change real numbers; Assign permanent breakpoints; Backtrace instruction execution sequences; Profile your program to find the most active spots; And much more. Introductory price at only \$90.
D-I-Y Systems
400 Amherst St.
Nashua, NH 03060
(603) 861-7140

BACKUP RESTORE

Backup database or other files from a Winchester to a floppy under concurrent CP/M and/or CP/M 86. • Automatic volume management • Selective file backup/restore • Database backup/restore • Compression reduces space required to store data. Requires IBM PC/XT or clone with 128K RAM, one diskette drive and Winchester disk. To order use MC/VISA or send \$99 to:



ANAND SOFTWARE, INC.
238 North Santa Cruz Ave., Suite 100
San Jose, CA 95131

ANAND SOFTWARE, INC.
238 North Santa Cruz Ave.
San Jose, CA 95131
(408) 366-2773

COPYWRITE

COPYWRITE MAKES BACKUP copies of all IBM PC software. No exceptions. CopyWrite is revised monthly, to keep up with the latest in copy protection, and comes with a trade in offer. It needs an IBM PC or XT 544 bytes and one disk drive, but can use more memory or another drive. Price: \$50 US funds. U.S. Inquiries.

QUAD SOFTWARE LIMITED
620 Jarvis Street, Suite 2412
Toronto, Ontario M5V 2B6 Canada
(416) 961-6243

PADLOCK/PADLOCK II DISKS

PADLOCK furnishes the user with a method for providing protection against unauthorized duplication from DOS commands 809. PADLOCK II disks come preformatted with finger-print and serialization. PADLOCK II disks offer protection. Ask about our fast data encryption product. All work with hard disk, ESE/COM files and all DOS versions. MC/VISA.
GLENCO ENGINEERING
3820 Ridge Ave.
Arlington Heights, IL 60004
(312) 992-2492

REPORT FOR dBASE II

The Ultimate dBASE II Report Generator! Multi-file reports using 40 output fields. 9 selection criteria using 7 Boolean operators. 8 break levels with totals, subtotals, counts. 5 lines of output w/adjustable field widths. Multi-level sorting using dBASE II indexes. Titles & field headings. Only \$95 + \$5 s/h.
AUTOMATED OFFICE SYSTEMS
4180 Chae Dr.
Atlanta, GA 30319
(404) 237-9420

SCREEN MANAGEMENT SYSTEM

SMS is simply the best utility available for designing, using, and saving color/multicolor screen displays. DOS/IB's are supplied in BASIC to input, output, and edit screen data fields. Loads of extra features. We have been in business 15 years, winning many awards for programming excellence. Price \$195, demo \$50. Manual \$10. VISA/MC PC/KT/JR or 64K/11 Disk. DNA SYSTEMS, INC. PO Box 1424 Saginaw, MI 48605 (517) 783-0185

SHOOP-DISKETTE UTILITY

Produce graphic maps of diskettes and files. Comprehensive diskette analysis. Add, delete or modify labels. Pageable directory. Change file attributes. Display, modify or search diskettes or files. More, in a single, easy-to-use program. Reqs 64K, DOS 1.1, 2.0 or 2.1. PC, XT, JR & many compatibles, mono or color. Introductory price \$40, with manual. OTTER CREEK SOFTWARE 715 Hunting Lane Goode, Virginia 24555

Hard Disk DIRECT ACCESS™

The ULTIMATE utility for any hard disk user. DIRECT ACCESS is a powerful hard disk management tool. Organizes your software programs into a "user defined" menu system. Features attractive screen display, rapid access into an application using a single keystroke & easy to learn. Also handles batch files & complicated DOS commands. Order today Only \$44.50 + \$2.50 shipping. MC/VISA. DELTA TECHNOLOGIES P.O. Box 1104 Eau Claire WI 54702 (715) 832-0958

DOS PATH Command For Data

Now your programs can access data files under DOS 2.0+, no matter where they are located. DPATH, a system-resident program extending the functionality of your DOS PATH command to include data files, includes a screen-oriented maintenance utility and a 60-page user manual. Requires PC-DOS 2.0 \$25. PERSONAL BUSINESS SOLUTIONS, INC. PO Drawer 757 Frederick, Maryland 21701

DOS 200LS™ UTILITY PACKAGE

Unique, valuable utilities for DOS 2.0 + 2.1, not found elsewhere. Ends confusion + let all pre-2.0 programs use subdirectories. Moves files between directories, remove deleted entries to speed searches + free disk space, show "tree" graph, log DOS usage. Over 30 programs, too much to describe here, for \$65 + shipping. VIMAGE INFORMATION CO., INC. 70 Greenwich Ave. Suite #300 NY, NY 10011 (212) 319-6420

COPY II PC

COPY II PC backs up protected & unprotected software, with verification. Available memory is fully utilized to minimize disk duplication time. Also includes a drive speed utility that can pinpoint drive problems. For IBM-PC, \$39.95 + \$3 s/h. (88 outside North America). Prepayment required. CENTRAL POINT SOFTWARE, INC. 9700 SW Capital HWY #1008 Portland, Oregon 97219 (503) 244-5182

MICROSOFT XENIX-UNIX SYS 3

Multi-user, multi-tasking System III plus Berkeley enhancements. Bourne Shell, "C" shell, the vsh visual shell, v, almost 200 Utility programs. Networking via uucp and Mnetel (LAN). Utilities move files between DOS & XENIX. File & Record locking. 10 simultaneous prims. Total OS-\$595. Development pkg \$395. Test pkg \$495, all \$1350. Unixist Systems 602 Park Point Drive Golden, CO 80401 (303) 526-9263

MEMORY SHIF™ PRICE SLASH

MEMORY SHIF™ allows your computer to run up to nine programs at once! You can swap programs in seconds & pass information between programs. We are sure that this is one of the best products on the market at any price so we're offering an unconditional money-back guarantee! NOW ONLY \$79 (8 shipping). DATABASE SOLUTIONS (800) 338-5060 OR IN CA (619) 236-1182

FULL CONTROL FROM BASIC

Cut development time, add speed & power to your programs w/ NUB. A library of assembly language sub-routines caters from BASIC execute com & exe files, save & restore areas of the screen, clear & scroll windows, much more! Add DOS functions to your menus. Create test help screens. Unlimited uses. \$49.95 + \$4h. MC/VISA/CHECK. FR - 6% tax. NATIONAL SOFTWARES 65 East Elizabeth Ave. Bethlehem, PA 18018 (212) 867-4800

DELUXE FILE MANAGER

At last! Display disk directories sorted ANY WAY you want. List hidden/system files. Perform file operations (type, delete, etc.) using SINGLE KEY commands after selecting file with cursor. Great timesaver! Many useful features to put you in control of your files. Executable from BASIC. \$39.95. Free brochure. WORLD CLASS SOFTWARE Box 2146 Toledo, Ohio 43603 (419) 696-8086

VISI ON WORK ALIKE—\$49.95

Now, you can have a complete system which works like VisiCorp's Visi On for only \$49.95. (See our feature length article in BYTE Magazine, January 1984, page 104). Runs on IBM-PC or XT in mono or color. Comes complete with multi-window environment, word processor, spread sheet, document formatter, mini-DOS, BASIC interpreter, and more. Send \$49.95 check or money-order to: REASON RESEARCH PROJECT 112 Esplanade, Suite #241 Pacifica, CA 94044

SOFTWARE

WORD PROCESSING

ULTIMATE™

Ultimate™ is a function key oriented, menu-driven word processor comparable to larger dedicated systems. The system offers over 100 WP functions and utilities including an 80,000 word spell checker, merge, boiler plate call-back and the most advanced printing and sheetfeed capabilities. An on-line help facility, complete users manual and adhesive color coded key tabs are provided to facilitate minimal training time. A truly user friendly system. SOFTWARE SYSTEMS, INC. 52 Oakland Ave., North E. Hartford, CT 06108 (800) 243-4646

WordPerfect

A powerful word processing package which comes with special features such as a spelling dictionary, math, text columns, footnotes, headers/footers, and macros. Proportional spacing and special characters such as Greek, math and foreign symbols are supported. Easy to learn and use. \$49.95.

SATELLITE SOFTWARE INTERNATIONAL 288 West Center Street Orem, UT 84057 (801) 224-8554

LASER TYPE

Laser Type is an intelligent text formatter capable of generating table of contents, preface, index, line tables for term papers, software & technical manuals, & books. Laser Type is highly command oriented with sophisticated commands including keep areas, font selection board test, chapter, section, subsection. \$395. SOFTLAB, INC. PO Box 879 St. George, UT 84770 (801) 628-4869

PC-WRITE™

Features: wordwrap, search/replace, justify, block move/copy/delete, headers/footers, etc. Help screen, quick-ref card, 100 page manual. Split screen, edit two files at once. Disk with software and manual \$10; registration with support, source, and commissions \$75. Shareware: can copy and share with others. VISA/MC. QUICKSOFT 219 First North #224 Seattle, WA 98109 (206) 282-0452

MY WORD IS JUST \$25!

MY WORD is a W-5 word processor for the IBM PC/XT/JR or compatible (even Tandy 3000). Sort, mail merge, quick print, use 256 char! Word wrap, 100+ operations, won't lose text, ASCII files. Manual with index included. Full source code just \$25 more! 96K, 1 drive, DOS 1.1, 2.0, or 2.1. 30-day money-back guarantee! T.N.T. SOFTWARE, INC. 34083 Hainesville Road Round Lake, IL 60073 (312) 223-0832

OFFICEWRITER

A Wang-like word processor designed for first-time users. Continuous screen formatting and logical keyboard layout make OfficeWriter one of the most natural word processors on the market. Advanced features include mail merge, data base and spreadsheet interface, and document to ASCII conversion. On-screen tutorial and help facilities included. \$325. OFFICE SOLUTIONS, INC. 5708 Odessa Road Madison, WI 53719 (608) 271-5047

Apple
II

CP/M

IBM
PC

SPECTRUM

Professional Software Products

MATHEMATICS SERIES

The Series Includes These 4 Programs:

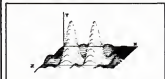
STATISTICAL ANALYSIS I: This menu driven program performs LINEAR REGRESSION analysis, determines the mean, standard deviation and plots the frequency distribution of user-supplied data sets

NUMERICAL ANALYSIS: HI-RES 2-dimensional plot of any function. Automatic scaling. At your option, the program will plot the function, plot the INTEGRAL, plot the DERIVATIVE, determine the ROOTS, MAXIMA, MINIMA and INTEGRAL VALUE

MATRIX: A general purpose, menu driven program for determining the INVERSE and DETERMINANT of any matrix, as well as the SOLUTION to any set of SIMULTANEOUS LINEAR EQUATIONS

3-D SURFACE PLOTTER: Explore the ELEGANCE and BEAUTY of MATHEMATICS by creating HI-RES PLOTS of 3-dimensional surfaces from any 3-variable equations. Hidden line or transparent plotting

For APPLE II (48K) and IBM PC (64K) \$50.00



BUSINESS SOFTWARE SERIES

Both Programs \$250.00

A user-friendly yet comprehensive double-entry accounting system employing screen-oriented data input forms, extensive error-trapping, data validation and special routines for high speed operation. The series includes these two modules:

GENERAL LEDGER: A complete accounting system with these features:

- Up to 500 accounts and 500 transactions per month.
- Interactive on-screen transaction journal
- Produces these reports:
 - Transactions Journal
 - Account Ledgers
 - Income Statement
 - Balance Sheet
 - Account Listings

For APPLE II and IBM PC \$150.00

ACCOUNTS RECEIVABLE

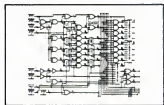
A flexible system with these features

- Up to 500 accounts and up to 500 invoices per diskette
- Prints invoices, customer statements & address labels
- Interfaces to General Ledger
- Interactive screen-based invoice work sheet
- Produces these reports:
 - Aged Receivables
 - Sales Analysis
 - Account Listings
 - Customer Balances

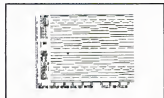
For APPLE II and IBM PC (2 DISKETTES) \$150.00

MICRO-LOGIC

An interactive graphics program for designing and simulating digital logic systems. Using the built-in graphics module, the user creates a logic diagram consisting of AND, OR, NAND, NOR, EX-OR, D, T, JK, FLIP FLOP and powerful 16 pin user-defined MACRO functions. A typical page of a logic diagram looks like this:



The system provides on-screen editors for NETWORKS/MACROS DATA CHANNELS, CLOCK WAVEFORMS and GATES. GATE attributes include DELAY, TRUTH TABLE, NAME and I/O clocking



The system is available for Apple II and IBM PC computers. A non-graphics version is available for CP/M 2.2. It uses the screen editor to create netlists and text printer plots to display simulation results. All versions require 2-5 1/4" disk drives

For APPLE II, IBM PC (128K) and CP/M (70K) \$450.00
MANUAL & DEMO DISKETTE \$50.00

PERSONAL FINANCE MASTER

The premier personal and small business financial system. Covering all types of accounts including check registers, savings, money market, loan, credit card and other asset or liability accounts, the system has these features:

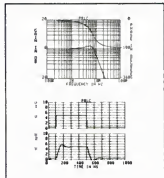
- Handles 25 Asset/Liability Accounts
- Monthly Transaction Reports
- Budgets Income & Expense
- Reconciles to Bank Statements
- Prints Checks & Mailing Labels
- Automatic Year-End Rollover
- Prepares a Net Worth Reports
- Searches for Transactions
- Handles Split Transactions
- User-Friendly Data Entry Forms
- Fast Machine Language Routines
- Extensive Error Trapping
- HI-RES Expense/Income Plots

For APPLE II and IBM PC \$75.00

MICRO-CAP

Microcomputer Circuit Analysis Program

Tired of trial & error circuit design? Analyze and debug your designs before you build them. With MICRO-CAP you simply sketch your circuit diagram on the CRT screen and run an AC, DC or TRANSIENT ANALYSIS. Your circuit may consist of RESISTORS, CAPACITORS, INDUCTORS, DIODES, BATTERIES, BIPOLAR or MOS TRANSISTORS, OPAMPS, TRANSFORMERS, and SINE/SIGNAL or USER-DEFINED TIME DEPENDENT VOLTAGE SOURCES. MICRO-CAP can analyze any such network containing up to 40 separate nodes. Includes a user controlled MACRO library for modelling complex components such as OPAMPS and Transistors



For APPLE II and IBM PC computers. A non-graphics version using an on-screen editor to enter networks, and text printer plots to display simulation results is available for CP/M (2-5 1/4" SSD) systems. Requires 2 disk drives

For APPLE II, IBM PC (128K) and CP/M (70K) \$475.00
MANUAL and DEMO DISKETTE \$50.00

ORDERING INSTRUCTIONS: All programs are supplied on disk and run on Apple II (64K) or IBM PC (128K) with a single disk drive unless otherwise noted. Detailed instructions included. Orders are shipped within 5 days. Card users include card number. Add \$2.50 postage and handling with each order. California residents add 6 1/2% sales tax. Foreign orders add \$5.00 postage and handling per product.



**SPECTRUM
SOFTWARE**

690 W. Fremont Ave., Suite F
Sunnyvale, CA 94067



FOR PHONE ORDERS:

(408) 738-4387

DEALER INQUIRIES INVITED.

CIRCLE 497 ON READER SERVICE CARD

IBM **PC**

SPECIAL \$2,449
2544

2 Floppies 360K controller

KEYBOARD \$125 IBM COLOR CARD \$249
PLANTRONICS COLOR PLUS \$379
immediate availability

IBM — XT in stock!!! & CALL

COLUMBIA CORONA CABLE XT 2200A SCALL

BHART-NEVADA (800) 845-5555
ORDERS & INFORMATION (702) 451-3300
P.O. BOX 30029 HENDERSON, NV 89011 Mon-Fri 10:00 AM-5:00 PM

CIRCLE 841 ON READER SERVICE CARD

SAVE ON
DISKETTES

\$180 **\$235**
Qty 20 Qty 20

5 1/4" 5DD-1074 \$2.49 ea 5 1/4" 5DD-1074 \$3.55 ea
Bosch in 10's with Typex sleeves, reprinted rules and more.

DISKETTES FOR MACINTOSH & HP-100
AT TYPING SAVINGS

256K Memorex \$2.99 ea

See our big ad in this issue for other great values!
Shipping: 5 1/4" or 5 1/8" DISKETTS—\$2.00 per 100 or lower quantities. Payment: VISA and Mastercard accepted. C.O.D. orders only add \$2.00 handling charge. Taxes: Illinois residents, please add 6% sales tax.

WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE
ON THE SAME PRODUCTS AND QUANTITIES.

Nationwide: 1-800-821-8527
Illinois: 1-312-944-2788
Hours: 9AM - 5PM Central Time
Minimum Order: \$35.00

DISK WORLD, Inc.
Suite 400F • 20 East Huron Street • Chicago, Illinois 60611

CIRCLE 837 ON READER SERVICE CARD

FREE CATALOG!

Just let us know and we'll mail you a **FREE Creative Computing Catalog**—16 pages filled with books, buyer's guides, magazines, and more!

To get your **FREE** catalog, write to: **Creative Computing Catalog**, Dept. NALX 39 East Hanover Ave., Morris Plains, NJ 07950.

PC MAGAZINE • AUGUST 21, 1984

WHAT A SWITCH!

Intra's **Printer Switch** for all Personal and Business Computers lets your **Word Processor's** copy be easily directed to either a **Dot Matrix** or **Letter Quality Daisywheel Printer**. Compatible with all Centronics Parallel type interfaces, the **Printer Switch** is styled to match computer hardware in the Home or Office.

\$165
Including
Cables



Intra Computer

101 W. 31st Street
New York, N.Y. 10001
(212) 947-5533

CIRCLE 167 ON READER SERVICE CARD

inmac
PERSONAL COMPUTER SUPPORT CATALOG

CALL TOLL FREE

FREE COPY

Inmac makes it easy to make your computer work harder.

- Choose from over 2000 products, all especially selected to help you get more out of your computer.
- **Guaranteed quality.** Most guaranteed for one year, some guaranteed for life.
 - **45-day risk-free trial.** Full refund if not completely satisfied.
 - **One-stop shopping.** Paper, connectors, cables, more. Many exclusive Inmac products, too.
 - **Easy ordering.** Mail, phone or TWX. Verbal P.O.'s welcome.
 - **Lower shipping costs.** All 9 Inmac distribution centers are fully stocked, so your order can be shipped from the nearest center.

1-800-547-5444*

inmac

Please send me a free copy of Inmac's Personal Computer support Catalog.

Inmac Catalog Dept.
2465 Augustine Drive
Santa Clara, CA 95051

NAME _____
COMPANY _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____ PHONE _____

*In California, call 1-800-547-5444 for your free catalog.

451308

CIRCLE 225 ON READER SERVICE CARD



PIPELINE

COMPUTERS

The Source For All IBM Compatible Products

SANYO UPGRADE KIT

- ★ One Teac 360K Disk Drive
- ★ Software for 360K Drive
- ★ Twice the Storage Capacity

List \$399 **\$239**

APPRICORN PORTS

- ★ Parallel Card or Serial Card

List \$149 **\$89**

IBMP SYSTEM W/10 MEG

- ★ 256K, 2-360K Disk Drives
 - ★ 10 Meg Hard Disk
 - ★ Interface Card & Monitor
- Other Configurations Available

List \$4795 **\$3495**

JUKI PRINTER

- ★ Model No. 6100
- ★ Bidirectionally 18 cps
- ★ Proportionally spacing

List \$599 **\$449**

IDEA MODEM

- ★ PC Internal 1200 Baud
- ★ Hayes Compatible
- ★ Complete w/software

List \$495 **\$349**

MAYNARD HARD DISK

- ★ 10 Meg Internal
- ★ Controller
- ★ Software Included

List \$1495 **\$998**

COMPAQ SYSTEM

- ★ 2 Drives, 360K
- ★ 256K of Ram

List \$3495 **\$2395**

64K MEMORY EXPANSION

- ★ 1 Year Warranty
- ★ 9 to a Set

List \$89 **\$49**

EPSON PRINTER

- ★ FX80
- ★ 160 cps

List \$699 **\$489**

PC DUST COVERS

- ★ Covers Monitor
- ★ Keyboard & Mainframe

List \$29 **\$19**

TEAC DISK DRIVE

- ★ FD55B
- ★ 360K Slimline
- ★ PC Compatible

List \$999 **\$169**

TAVA PC

- ★ 16 bit cpu
- ★ 128K Ram
- ★ Two 360K Drives
- ★ Mono Monitor
- ★ Parallel & Serial Ports

List \$2495 **\$1789**

PIPELINE
COMPUTERS

The Source!



- We Accept MC, Visa, Wire Transfers, Certified Checks
- COD's Available
- All Prices Reflect a Prepaid Discount

- Shipping Minimum 4.50
- Purchase Orders Accepted
- This Ad Supersedes all Others

Prices Subject to Change

The Source!



CIRCLE 143 ON READER SERVICE CARD

CALL TOLL-FREE (800) 841-0905

For Lowest Prices & Fast Delivery

IBM COMPATIBLE DISK DRIVES

TANDON	
TM-55-2, 1/2 Height (360K)	\$ 209
TM-100-2 (360K)	\$ 209

TEAC	
FD55A Sgl. Head (160K)	\$ 149
FD55B Dbl. Head (360K)	\$ 169

PANASONIC — SHUGART	
SA455-Panasonic	\$ 159

CDC	
9409 Dbl. Head (360K)	\$ 229

PRINTERS

OKIDATA	
ML 82A (120 cps)	\$ 319
ML 92A (160 cps)	429
ML 93A (160 cps) 15" carriage	729
82 & 92 Tractor Option	59
92 & 93 Plug & Play	49

C. ITOH	
B51DAP Prowriter	\$ 339
F10-40 Starwriter	979
F-10-55 Printmaster	1319

JUKI	
6100, 18 cps ltr. qual	\$ 449
Tractor Feed	129

MODEMS

HAYES MICRO INC.	
Smart Modem 300	\$ 205
Smart Modem 1200	489
Internal 1200B	399

ANCHOR	
Mark VII 300 Baud	\$ 94
Mark XII 1200 Baud	269

PROMETHEUS	
ProCom 1200	\$ 369

RIXON	
PC212A, 1200 Baud Stand Alone	\$ 409
P212A, 1200 IBMPC	409

U.S. ROBTICS	
Password, 1200 Baud	\$ 339

NOVATION	
Access 123	\$ 449

MONITORS

AMDEK	
300G, 12" Green	\$ 199
300A, 12" Amber	139
310A, 12" Amber Monochrome	169
Color I + Color Composite	999
Color II + RGB w/Cable	409

PRINCETON GRAPHICS	
HX12, RGB PC Copy	\$ 479

DISKETTES

PIPELINE	
Dbl./Dbl. Reinforced Hub 1 year warranty	\$ 19
Flip File Holds 70 (smk. plexiglass)	16

IBM & COMPATIBLE COMPUTERS

IBM	
PC w/64K, 1 Drive (128K)	\$1975
PC w/64K, 2 Drives	9195
PC XT, 128K 10 Meg Disk	4495
PC Jr.	1199

COMPAQ	
Compaq 128K, 1 Drive	\$1895
Optional Drive	229

EAGLE	
PC-2, 128K, 2-320K Drives	\$2550
PC-2 +	2250

COLUMBIA	
1600-1, 2-Drives (360K)	\$2595
1600-4, 12MB Hard Disk	3875
MPC-XP Portable	2395

SANYO	
MBC 550, 1-Drive, software	\$ 789
MBC 555, 2-Drives, more software	1099
MBC 550-2	949
MBC 555-2	1295
Optional Serial Port	99

TAVA	
2-Drives, 128K, 2 Ser. 1 Par Port, Color Graphics Card & Hi-Res Green Monitor	\$1895

INTERFACE CARDS FOR IBM & COMPATIBLES

AST RESEARCH	
SixPac + 64K Par. & Ser. Software	\$ 269
Mega + 64K exp. to 512K Ser. Port	269
MegaPack 256K option for Mega	279
I/O + Ser. & Optional Par. Game	149
Additional Ports	49

QUADRAM	
Color I	\$ 219
Color II	229
QuadLink	449
Quad Board I	239
Quad Board II	269

HERCULES	
Color Graphics Card	\$ 339

PLANTRONICS	
Color +	\$ 379

IBM	
Dos 1.1	\$ 39
Dos 2.1	59
Monochrome Monitor or Adaptor	309

FLOPPY DISK CONTROLLERS	
Maynard	\$ 169
Maynard w/Ser. Port	229
Maynard w/Par. Port	229
Sigma Controller	159
Vista	159

PC PRODUCTS	
Rainbow Color Card	\$ 369

AMDEK	
MAI Card	\$ 489

DUST COVER	
Covers Monitor, Mainframe & Keyboard	\$ 19

MORE ACCESSORIES	
Koala Graphics Tablet	\$ 89
8087 Co-Processor	179
Kraft Joystick	39
Par. Printer Cable	39

The Source!



ORDER DESK:
(213) 970-0177
(800) 841-0905
(OUTSIDE CALIFORNIA)

MAIL ORDER:
1142 Manhattan Avenue, CP21
Manhattan Beach, CA 90266

CUSTOMER SERVICE:
(213) 970-0177

Mon.-Fri. 8:00 a.m. to 6:00 p.m.
Saturday 9:00 a.m. to 1:00 p.m.

"More Computer for Your Calculating Dollar"

Try the New

XPC-XT by **XOR**

Introductory Offer

\$1995⁰⁰

SY\$-8100-00

"Need a 16-bit IBM-PC™ to process your data?"

The first IBM™ compatible that IS compatible! A complete system including the PC-DOS™ operating system from IBM™. Two thrifline double-sided 5 1/4" Disk Drives hold 360K of formatted storage each, the other drive opening is fitted with a close-out plate. Removal of the plate will allow room for a Winchester Hard Disk. The Power Supply is like that of an IBM-PC XT™. Hard Disk ready! How compatible is the XPC-XT? It will run 1-2-3™, Flight Simulator™, dBASE III™, WordStar™, SuperCalc™, VisiCalc™ and hundreds of others. The system will also support MS-DOS™ 1.1 and 2.1, PC-DOS™ 2.2, CP/M-86™ and Unix Operating Systems. Add-on an additional 192K of RAM for a full 256K of on-board Memory for only \$198.00. This computer comes standard with 2 Serial and 1 parallel ports (IBM™ COM1 and COM2). No need to purchase Add-On cards.

BASIC XPC SYSTEM

If that incredibly LOW Total System price doesn't suit you, try this "Do It Yourself System" and take your pick of the wide range of options listed below.

The Features: +64K RAM +Expandable to 256K

- +4 DMA channels +5 Expansion Slots
- +Runs MS/DOS™ and CP/M-86™ (not included)
- +Multi-function Keyboard and Cable
- +Hard Disk Ready Power Supply
- +2 Serial and one Parallel Port
- +and MORE! +SY\$-8000-00

Only

\$895

The following are registered Trademarks and their Company: 1-2-3-Lotus Development Company, MS-DOS, PC-DOS, Flight Simulator-Microsoft, dBase II-Austin-Tate, WordStar-MicroPro International Corp., SuperCalc-Serim, Inc., VisiCalc-Visi Corp., Inc., CP/M-86-Digital Research Inc., IBM, IBM-PC, IBM-PC XT-International Business Machines.

Standard Features:

- +PC-DOS™ Operating System Vers. 2.1
- +64K of parity checked RAM, expandable on-board to 256K
- +8086 16-bit CPU
- +5 IBM compatible expansion slots
- +4 DMA and 3 Timer channels
- +Up to 32K of EPROM (supplied with full 8K)
- +DOS BIOS on EPROM
- +Full size capacitance touch keyboard with 10 function keys and calculator type numeric keypad
- +8087 Math Co-Processor ready
- +110-220 VAC, 50-60 Hz
- +High resolution, 12" Monitor with Green Screen and 18MHz bandwidth.
- +Two Slimline 5 1/4" DS/DD 40 TPI Floppies @ 360K storage each.
- +Floppy Disk Controller expansion card, runs up to four SS or DD Floppies
- +ALSO supports MS-DOS™ and CP/M-86™ Operating Systems
- +Power Supply is Hard Disk ready, no need to add-on additional power
- +Full One Year Parts and Labor Warranty on all XOR Manufacturing products!

Call or Write for Nearest Dealer and Full Catalog

IBM-TYPE KEYBOARD



IBM-type keyboard. Super touch! (Even easier than IBM!) L.E.D. indicator for CAPS and NUM LOCK. Also different layout available to conform with Selectric.

KEY-1000-00 \$199.00
KEY-1024-00 (SELC) \$199.00

POWER SUPPLY



Linear Power Supply with fan and power filter. Fits in case above. Uses 140 watts and runs Hard Disk. Mounting hardware and power cord included.
POW-1530-00 \$175.00
Also IBM replacement type for Hard Disk.
POW-1040-00 \$175.00

MOTHERBOARD



Two IBM-style mother boards. 5-slot and 8-slot. Five-slot has two serial slots and one parallel. Both 256K expandable.

BOA-8000-00 5-slot \$400.00
BOA-6050-00 8-slot \$485.00

FLOPPY DRIVES



Your choice: Panasonic or Hitachi 45-TPI double-sided. Perfect for your IBM-type systems. 90 day warranty! Shipped same day as ordered! Cables too!

(PAN) DRI-6600-00 \$175.00
(HIT) DRI-6650-00 \$170.00



XOR DATA SCIENCE

HARD DISK ADD-ON

Complete Packages

Includes BIOS Software, 5 1/4" Winchester Hard Disk, mounting hardware, interface P.C.B. for expansion slot, and all the necessary power and data cables (the Power Supply in the XPC-XT is Hard Disk ready).

10 Megabyte	65 Megabyte
\$995	\$2495
20 Megabyte	105 Megabyte
\$1295	\$3295
40 Megabyte	140 Megabyte
\$1795	\$4195

10-MEG TAPE BACKUP

★★★\$395.00★★★

1/2" high cassette type tape backup can be added to any HD system by removing one floppy. File managed software included.

IBM-TYPE CASE



Two styles to choose from. 5-slot and 8-slot. Includes hardware to mount drive and IBM-type circuit board, but no Power Supply.
CAB-3050-00 5-slot \$110.00
CAB-3060-00 8-slot \$110.00

COLOR

MON-1500-00 \$348.00

Three models of Color to choose from, each with higher and higher resolution. Price from \$248.00 to \$759.00. Monochrome Unit is outstandingly clear and easy on the eyes. In Green or Amber screens.



MONOCHROME

MON-1000-00 \$ 99.00



FLOP/SCSI/RTC

BOA-8648-00 \$148

MODEM

BOA-8725-00 \$295

HARD DISK

BOA-9050-00 \$325

MEMORY 512KW/64K

BOA-8550-00 \$190

BOARDS

COLOR/MONO

BOA-8410-00 \$289

PROM BURNER

BOA-8640-00 \$129

MULTIFUNCTION

BOA-8680-00 \$225

CALENDAR CLOCK

BOA-8700-00 \$ 99

User Group Status Report: IBM Support

The first reviews of IBM's PC User Group Support program are turning out to be mixed, and the level of participation has not been overwhelming. But don't count out IBM yet.

The first judgments are now coming in on IBM's implementation of user group support. This program consists of a monthly newsletter, a user group phone line, and a bulletin board system (see "PC User Groups: IBM Signs On," *PC*, Volume 3 Number 11). The phone line and bulletin board system are available for use by club officers. These officers collect questions directed to IBM and other user groups and also distribute the information provided by this service.

The newsletter, the *EXCHANGE*, is distributed once a month on a double-sided diskette. It is mailed directly to user group presidents. The IBM User Group Support Department's literature indicates that "the newsletter is intended for the exchange of technical information about IBM Personal Computer products." The department recommends that it should be freely distributed to the members of the user group. Probably the best way to do this is to place it in the group's software library. Selected articles could be reprinted in the club's own newsletter. You could reprint the entire *EXCHANGE*, but this would take quite some time and consume a large quantity of paper. A printout of a single copy of the first issue of the *EXCHANGE*, for example, created a stack of paper $\frac{3}{4}$ of an inch high.

The newsletter features graphics, sound, and a liberal application of the spe-



cial function keys. A PC with a graphics adapter will display attractive artwork and play lively music at the beginning of each major section of the newsletter. The *EXCHANGE* also provides function key assignments for help, page, sound, previous, next, print, run, demo program (if available), and exit operations. This kind of thoughtfulness is typical of the human engineering provided by most IBM software.

Phone Line

The user group support phone line is a (usually) human-answered communications link between user group officers and IBM's User Group Support Department. It operates from 8 a.m. to 5 p.m. Eastern Standard Time, Monday through Friday (except holidays). As it is answered, each

call is verified by a request for the caller's name, user group affiliation, and user group office title. If no one can answer a call, a message is taken and a staffer returns the call as soon as possible.

The support package of information that IBM provides to user groups states: "By limiting the use of this phone line to user group officers, we hope to minimize the number of busy signals and keep the line open for calls."

It is important to understand that IBM does not intend to answer technical questions on this phone line. According to the support literature, "IBM offers other services for this purpose." Instead, the phone line can provide answers to questions about user group activities, give information on how to contact other user groups, help with general questions about other user groups and about IBM products and services, take requests for IBM materials and services, and answer questions about IBM user group support programs. It also claims to offer assistance in forming new user groups. This is a bit of a paradox, though, since you have to be a user group officer to gain access to the phone number in the first place.

Bulletin Board

IBM's user group bulletin board is available for use 24 hours a day, 7 days a week. In addition to providing the type of

CLUB NEWS

information available over the phone line, the bulletin board allows for the exchange of technical hints and tips about IBM PC products. Clubs can also exchange information about their activities. A contact list of registered user groups is available on the bulletin board.

Users

Initially, I thought it would be easy to find people who have used the support program. As I started interviewing user group officers coast-to-coast, however, I quickly learned otherwise. Only a limited number of people had accessed the bulletin board or phone line, and a number of user group officers indicated that they weren't at all sure if they ever wanted to use these services.

When asked his opinion of the user group support program, for example, Benet Landsman, president of the Philadelphia Area IBM PC Club, indicated he had received the material but had looked only at the newsletter. Benet says, "It's good for a start. I personally didn't get any more out of it than I do from the newsletters we exchange with clubs all over the country."

Benet said that IBM will have to learn and evolve. "It would be nice if they sponsored regional meetings around the country for user group officers." IBM tried this at the West Coast Computer Fair and, with any luck, more meetings will be planned.

Dick Carr, president of the Greater Reno Operating Group, complained that he had called the user group support office in Boca Raton and followed it up with a letter. To this day he hasn't received an answer.

These are just a few of the comments I heard in discussions with user group officers. Most clubs just don't seem to be using the support system. A number of factors account for this neglect, including insufficient publicity, lack of faith in the support being provided, and complete apathy about the service altogether.

But perhaps the greatest user group

concern is IBM's use of a "you pay the toll" phone line. All phone charges for the user group support services are the responsibility of the user group, and IBM will not accept collect calls. Of course, IBM does pay for any return calls it has to make. Almost all of the user group officers I talked to objected to IBM's policy and felt that a toll-free 800 number should have been provided. IBM's justification for its procedure is that it keeps the amount of time spent on the line to a minimum. The less time each caller spends on the line, the more calls can be accepted. As a user group officer, I believe the lack of a toll-free number is not a major drawback.

The toll-free line can cause problems, however, if you try to access the bulletin board through a long-distance telephone service that uses lower-grade telephone lines. I tried this and ended up wasting my money. Approximately 50 percent of the characters were garbled and the bulletin board was unusable. Of course, this was my error, not IBM's. Rather than trying to save a few bucks on the call, it's a good idea to access the board through the highest-quality telephone lines available.

Personal Experience

My first exposure to the phone line came on a day when IBM was making a new product announcement. As usual, the announcement came on a Tuesday. Since I was interested in finding out about one of the new word processing packages, I called the phone line to ask some questions. The phone rang a couple of times, and I was greeted with a recorded message. It told me to identify myself and leave a phone number where I could be reached. I was expecting this, since Gene Barlow, manager of User Group Support, had informed me in an earlier interview that if a meeting were in progress an answering machine would take a message and someone would return the call. I was sure that most of his staff were attending the new product announcement that afternoon. I did not expect, however, that it would take until the following Friday to

have my call returned. Making matters worse, the individual who returned the call said that he hadn't had time to look over the particulars on the announcement, and that I would see the information in the next *EXCHANGE*. Basically, I got zero return on my investment of a long-distance phone call.

The bulletin board has its own problems. Once on the system, you are asked some identification questions and then given some options from a menu. I tried to browse through the mail area for messages left on the bulletin board, but immediately found out that this system doesn't allow you to scan messages unless they are addressed specifically to you. This defeats the purpose of a bulletin board system. If a club officer left a message regarding an error found in a software package or some hardware problem, it would be useful to allow that message to be viewed by everyone. I hope IBM changes this procedure in the near future.

I would rate the bulletin board as only fair. Many local bulletin board services are far easier to access than the one provided by IBM. The IBM board's options seem more limited than those on many public domain RBBS programs.

Only time will tell if the IBM's user group support program will become a success, but I tend to be optimistic. Although many problems need to be worked out, given IBM's vast resources, I'm sure the company will be able to solve them to the satisfaction and benefit of most user groups. ■

PC Magazine welcomes submissions from PC user group members on concerns of interest to other PC user groups. Fees for articles will be negotiated with the writer and will be payable only on acceptance. All articles are subject to editing. Article length is variable, and photographs (to our quality), tables, and program listings are welcome.

Address offerings and inquiries to: Club News, PC Magazine, One Park Avenue, New York, NY 10016.

IBM PC / VT100



EM100
for
**IBM PC, XT,
PORTABLE and
COMPAQ.**
also
**APRICOT and
VICTOR 9000.**

VT102 emulation, English setup menus, 110-9600
BAUD, ASCII file transfer, Modem 7 compatible
binary transfer, 132 columns on monochrome or
color adapters, soft keys, Moss-11 Greek characters,
Keytronics keyboard support, programmable scroll
rate & more. Optional Tecktronix 4010/4014
emulation.

\$175.00 single copy.
Multicopy discounts,
Site and Corporate Licenses.



Diversified Computer Systems
100 Arapahoe Rd. (303) 447-9251
Boulder, CO 80306

Dealer inquiries invited.

Trademark: VT100, Manual Equipment IBM PC, XT, IBM Corp.
1 XTOR 9000, Victor Technology, COMPAQ, COMPAQ Computers Inc.

CIRCLE 166 ON READER SERVICE CARD

SAVE HUNDREDS OF \$\$\$ BY UPGRADING MEMORY BOARDS YOURSELF!

INTRODUCING...

IBM MEMORY EXPANSION KIT COMPAQ COMPATIBILITY

Most of the popular memory boards allow you to add an additional
64K, 128K, 192K, or 256K. The IBM64K Kit will populate these
boards in 64K byte increments. The kit is simple to install — just
insert the nine 64K RAM chips in the provided sockets and set the
two groups of switches. Directions are included.

IBM64K (Nine 200ns 64K RAMs). . . . \$49.95

INDUSTRIES

Protect Yourself...

DATASHIELD® Surge Protector

Eliminates voltage spikes and EMI-RFI
noise before it can damage your equip-
ment or cause data loss. Six month war-
ranty. Power dissipation (100 microsec-
onds): 1,000,000 watts.

Model 100. \$69.95

DATA SHIELD® Back-Up Power Source also available.
Protect your PC or XT computer from black-outs and voltage sags.

PC200 (200 Watt Rating). \$349.95

XT300 (300 Watt Rating). \$489.95

\$10.00 Minimum Order — U.S. Funds Only
California Residents Add 4% Sales Tax
Shipping — Add \$10 plus \$1.50 Insurance
Send S.A.S.E. for Monthly Sales Plan!

Save \$100 — 30% each
on \$1000+ orders. Free 1984 JAMECO CATALOG
Price Subject to Change



1355 SHOREWAY ROAD, BELMONT, CA 94002
Phone Orders Welcome (415) 592-8097 Telex: 178403

CIRCLE 166 ON READER SERVICE CARD

Now For IBM PC!

**MCBA Mini-Computer
Software For
Distributors and Manufacturers**

—A FULLY INTEGRATED
ACCOUNTING AND DISTRIBUTION
MANAGEMENT SYSTEM

- RM COBOL
- SOURCE CODE AVAILABLE
- FIELD TESTED — 8 YRS.
- UP TO 9 INTERACTIVE MODULES
- G/L, A/R, A/P, PR, I/M, C.O.P., P/O
B.O.M.P., J/C
- Dealerships and Consultant Arrangements
Available



**Macola,
Incorporated**

181 S. Main Street Marion, Ohio 43302
(614) 382-5991

MCBA is a Registered Trademark of
Mini-Computer Business Applications

CIRCLE 263 ON READER SERVICE CARD

Contemporary ComputerWear

DUST COVERS
FOR
THE IBM PC



Attire your IBM PC in style! ComputerWear is dust protection
with class. Design features include select, woven fabric and
embroidered emblem. Order now. Satisfaction guaranteed.

☐ YES, PROTECT MY PC IN STYLE! SEND ME: ☐ CHECK
____ Keyboard(s) \$16 _____ Monitor(s) \$18 ☐ VISA
____ Drive(s) \$18 _____ Printer(s) \$18 ☐ MC
____ 1pc Mon/Drive \$36 Add \$2.00 Shipping Total: \$ _____
(CA Res. add tax)

Print Name: _____

Address: _____

City/State: _____ Zip: _____

Credit Card # _____ Exp: _____

Signature: _____

Contemporary ComputerWear At: EM

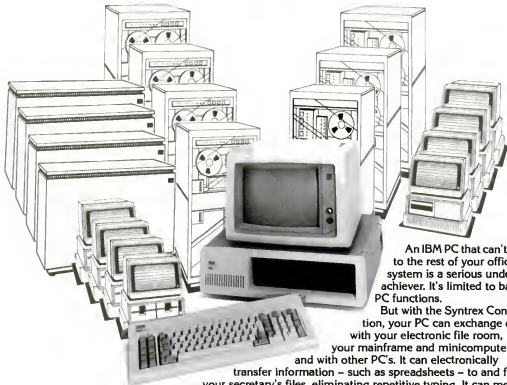
1320 36th Ave./San Francisco, CA 94122 • 415/564-0506

IBM PC is a trademark of International Business Machines Inc.

CIRCLE 121 ON READER SERVICE CARD

We're Taking IBM Public.

Syntrex can bring your IBM PC™ into the mainstream of your automation system.



An IBM PC that can't talk to the rest of your office system is a serious underachiever. It's limited to basic PC functions.

But with the Syntrex Connection, your PC can exchange data with your electronic file room, your mainframe and minicomputers, and with other PC's. It can electronically transfer information – such as spreadsheets – to and from your secretary's files, eliminating repetitive typing. It can merge figures and text, process text, format results, communicate with other stations anywhere in the network.

Don't let your IBM PC operate at half potential. Call right away. Because an electronic mind is a terrible thing to waste.

SYNTRIX INCORPORATED 246 Industrial Way West • Eatontown, NJ 07724
1-800-526-2829/in NJ (201) 542-1500

SYNTRIX

™IBM PC is a registered trademark of IBM Corporation.

We're on a roll.

CIRCLE 125 ON READER SERVICE CARD

Tips on dBASE II

Making the most of dBASE II's power is not always easy. But a few simple techniques can help turn you into a pro.

As a long-time user of dBASE II, I am a bit surprised at some of the command files (run-time applications) that have been written and published by both experienced programmers and novices. I suspect that most users' difficulty with such software stems from its often rather forgettable documentation; some commands are poorly explained, while others are not touched on at all.

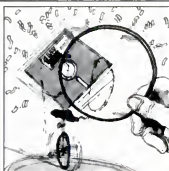
Beginning in this article, and continuing in the next issue, I'll attempt to describe a few techniques that may benefit many dBASE II users and help clear up this problem. I'll start with a discussion of how to write more compact command files.

Writing Tight Code

The simplest way to save keystrokes when writing a command file involves initialization of memory variables. Say you want to initialize character variables M:NAME, M:ADDR1, M:ADDR2, and M:ADDR3. Assume that M:NAME is of length 15, and the other three are of length 30.

Instead of writing the contents of Figure 1, you can save keystrokes and minimize the possibility of miscounting blanks by replacing the last three lines with the following code, all on one line:

```
STORE m:name+m:name
```



```
TO m:addr1,m:addr2,m:addr3.
```

Many people test for a condition only to assign T or F to a logical memory variable. For example, instead of writing

```
IF m:prsc = 'PRINTER'
  STORE T TO m:print
ELSE
  STORE F TO m:print
ENDIF
```

you can accomplish the same result with the following single line of code:

```
STORE m:prsc = 'PRINTER' TO
m:print
```

Or, instead of writing

```
WAIT TO ok
STORE ! (ok) TO ok
```

DISCOUNT BUSINESS SOFTWARE

for the IBM PC[®] / PCjr[®]

• NOW IN OUR 5TH YEAR •

SOFTWARE SPECIALS

- NEW! Ashton-Tate FRAMEWORK SCALL •
- Ashton-Tate NEW dBASE III PKG. SPECIAL •
- dBASE III PLUS Sensible Designs dProgrammer
- An easy-to-use Applications Generator written in dBASE III PLUS • complete G/L Accounting System with SOURCE CODE included! (List \$990)
- PACKAGE SPECIAL \$519 •
- dProgrammer only (List \$295) SPECIAL \$239 •
- dBASEII TO dBASEIII UPGRADE 139 •
- BPI GENERAL ACCOUNTING 359

• LOTUS SYMPHONY •

• SPECIAL \$409 •

- LOTUS 1-2-3 TO SYMPHONY UPGRADE \$129 •
- LOTUS 1-2-3 (While they last) 285
- MICRO RIM R. BASE Series 4000 269
- MICROSOFT WORD W/MOUSE 279
- MONDGRAM DOLLARS & SENSE 99
- PETER NORTON UTILITIES 2.0 49
- SATELLITE SW WORD PERFECT 229
- SOFTWARE PROD. INT. OPEN ACCESS 359
- SOFTWARE MULTIMATE 269

HARDWARE SPECIALS

- HAYES MICRO SMARTMODEM 1200B 395
- HERCULES GRAPHICS CARD 325
- COLOR CARD 175
- NOVATION ACCESS 1.2.3 379
- PARADISE MULTI-DISPLAY CARD 399
- STB GRAPHICS PLUS COLOR CARD 259
- SUPER RID w/SAN & PC ACCEL. 279
- 2-RS232, 1-Parallel & Game Ports • Clock

ATTN. CORPORATE BUYERS

As a volume buyer, we can offer you our KEY ACCOUNTS PROGRAM . . .

- Quantity Discounts
- Priority access, Toll-Free Order/Product Information Lines
- Same Day Emergency Shipments
- Scheduled Delivery Programs
- Free Micro Auditor[®] Technical and Consulting Services
- Credit terms to qualified corporations
- In-house computer training and management seminars

Call our Director of Marketing to discuss your requirements. Get why hundreds of corporations have found us either honest, straight talk-not a lot of sales hype. We're not the biggest, just reliable, honest people who have seen a lot of competition come and go over the last five years.

• CALL 213-823-0767 •

MINIMUM \$300 ORDER

MON.-FRI. 10AM - 4PM PACIFIC TIME

TERMS: MAIL-ORDER ONLY—Prices discounted for FRUITED ORDERS & subject to change. 90% terms slightly higher. We cannot guarantee product compatibility. ALL SALES FINAL. PAYMENT: Cashier's Ck./M.O. Other cks. allow up to 30 days. Bank Transfers - CA Residents: Add 6% Tax (LA 6 1/2%) Shipping/Handling: Add 2% (min. \$6) SPS surface Parcel / Foreign/Special handling: Add \$75 + Postage. MASTERCARD/VISA: Add 2% of Total Order (Min. \$300) AMERICAN EXPRESS: Add 6% of Total Order (Min. \$300)

• IBM PC, PCjr, IBM XT, IBM AT, PC021

• FREDERICK E. DEEG & Associates, Inc.
13234-A FIJI WAY
MARINA DEL REY, CA 90292

IBM PC™

If you find
a better price,
call us.

64K, 1/360K Drive**\$1650**

Typical Configurations

IBM PC 64K

1 Drive, Monochrome Monitor & Card

\$1995

or add

10 meg Internal Hard Disk

with these features:

- Full height hard disk
- Plug compatible w IBM XT*
- One year warranty
- Requires no extra power

\$2890

Compaq 256K, 2/360K drives . . .	\$2349
Compaq 256K, 1/360K drive,	
10 Meg Internal	\$2995
10 Meg Internal Hard Disk	\$895
64K RAM chips for PC's	\$49
Tandon TM 100-2, DS/DD	\$199
Control Data 9409, DS/DD	\$199
Taxan Monochrome	\$165
Amdek 310 A Monochrome	\$165
Princeton PGS HX-12 (RGB)	\$499
Quadram QuadColor I	\$209
Persyst mono card w/parallel	\$229
Quadram Quadjet	\$695
TI 855	\$849
Juki 6100	\$449
Okidata ML92P	\$449
Okidata ML93P	\$709
Epson FX-80	CALL
Epson FX-100	FOR
Epson LQ-1500	PRICE
AST SixPack Plus (64K)	\$259
Quadram Quadboard (64K)	\$285
MultiMate 3.22	\$299
Multiplan	\$145
ProKey 3.0	\$89
Norton Utilities	\$55
DbaseII	\$299
Open Access	\$299
Lotus 1-2-3	\$339
Wordstar ProPack	\$399

Prices subject to change without notice.

SHIPPING FREE WITHIN USA.

IBM is a trademark of IBM Corp. Credit cards and 3% Quantity Pricing Available.

Corporate PO's accepted.

ORDERS ONLY, CALL**1-800-IBM-5150****PC'S LIMITED**

(512) 452-0323

CALL FOR LATEST PRICES

7801 N. Lamar, #F-1

Austin, Texas 78752

PROGRAMMING

IF ok='Y'

or writing

WAIT TO ok

IF ok='y' .OR. ok='Y'

you could write the shorter

WAIT TO ok

IF ok\$'yY'

As another example, say you have a command file that has a series of REPORT FORM commands. You want to give the user a chance to specify the destination of the report (screen or printer) before each REPORT FORM command is issued. Instead of asking the user each time and then having an IF-ENDIF loop such as

```
IF printer
  REPORT FORM report1 TO PRINT
ELSE
  REPORT FORM report1
ENDIF printer
```

it seems better to include a menu selection that a user selects only when he wants to change the destination of the reports. This selection could assign either of two values to a memory variable, say

STORE ' ' TO select

designating the screen as the report destination or

STORE 'TO PRIN' TO select

making the destination the printer.

Then, any FRM file can be invoked

with the one-line command

REPO FORM report1 &select

The Report Form Command

The REPORT FORM command of dBASE II is the easiest way to produce a decent report out of the database currently in use. It also provides proper word wrapping for text strings that are allocated a narrow column width.

Some users are always faced with the problem of wanting to display more data than can be normally accommodated on an 80- or 132-column page. For example, suppose that the following fields were contained in a database:

NAME	TYPE	WIDTH
EMPLOYEE	C	20
ADDR1	C	25
ADDR2	C	25

It's easy to get dBASE II to write the above three fields in one field column with a report layout like this:

```
EMPLOYEE NAME
STREET
CITY, STATE ZIP
```

to produce reports like this:

```
John A. Smith
123 Main Street
Rockville, MD 20850
```

by responding to dBASE II's prompt dur-

```
STOR ' ' TO minname
STOR ' ' TO m:addr1
STOR ' ' TO m:addr2
STOR ' ' TO m:addr3
```

Figure 1: A listing showing the "long" way to initialize memory variables.

```
COL WIDTH,CONTENTS
001 25,employee+ ' +addr1+addr2
ENTER HEADING:<EMPLOYEE NAME;STREET;CITY, STATE ZIP;=====
```

Figure 2: Code showing how to wrap column headings in REPORT mode.

PROGRAMMING

ing the FRM file creation with the code in Figure 2.

The trick here is to pad any field shorter than the specified column width with enough blanks to force a word wrap to the next line. The < in the heading, of course, left-justifies the text of the heading.

The REPORT FORM command can

dBASE II does not handle arrays like traditional high-level languages do.

also be used to generate free-form reports without any column headings, page numbers, or dates. For example, if you just wanted a simple report such as:

```
John A. Smith,  
123 Main Street,  
(301) 123-4567
```

all on one line, you could specify something like the contents of Figure 3. (Note that no heading is specified.) The REPORT FORM command is then invoked with the PLAIN option.

No Asterisks

When I write a command file, I always begin the file with a half page to a page of comments that constitute a brief documentation of the system. This block of comments includes a description of all files used by the system (DBF, FRM, NDX, and so on). I include the structure of all databases used. I obtain this information from dBASE II via the LIST STRUCTURE command, and I capture it into a disk file via the SET ALTERNATE command. The disk files are included in the command file with the Ctrl-KR command of my favorite text editor, WordStar.

To turn the lines into comments, I could go through the laborious (even with WordStar) task of inserting an asterisk on each and every line. But there is a much easier way; I merely surround the block of

comments with an IF impossible and ENDIF statement as in Figure 4.

The block of text in the IF-ENDIF block is ignored because IF impossible always yields a false value, for the same reasons that a DO WHILE T loop is always executed because it actually means DO FOREVER.

Handling Arrays

Unfortunately, dBASE II does not have a facility for handling arrays like traditional high-level languages do. BASIC, for example, has the DIM statement and an array index facility. Most users emulate array handling by assigning the elements of a string array to one long memory variable. For example:

```
STORE 'JanFebMarAprMayJun  
JulAugSepOctNovDec' TO  
months
```

(all on one line). Any month can then be extracted from the variable MONTHS, by the substring function \$.

I handle arrays using dBASE II's macro facility. For example, the BASIC loop

```
FOR I=1 TO 9  
PRINT LINE$(I)
```

NEXT I

can be written in dBASE II as

```
STORE 1 TO I  
DO WHILE I < 10  
STORE STR(I,1) TO Ichar  
? line&Ichar  
STORE I+1 TO I  
ENDDO WHILE I<10
```

Variable Length Records

My consulting organization uses an electronic filing cabinet program, FILE-CAB3, that we wrote completely in dBASE II. This program allows us to retrieve documents obtained from hard-copy documents via an optical character reader, and abstracts created using a text editor or entered via the keyboard under control of the program. The document abstracts are, of course, of varying length. We handle this by keeping a secondary database that maintains pointers to the abstracts database. The ABSTRACT database has only one field:

```
LINE,C,77
```

(setting the length at 77 allows space for the colons in an 80-column screen during

```
COL          WIDTH,CONTENTS  
001          80,employee-', '+addr1-', '+phone  
ENTER HEADING: <cr>
```

Figure 3: A program to generate a free-form report without column headings.

```
IF impossible  
CAC.PRGM (c) 1983 Darwin Systems, Inc.  
DATE WRITTEN: 12/12/83  
PURPOSE: This command file ...  
  
DBF USED:  
  
DBF STRUCTURE:  
  
...  
ENDIF impossible
```

Figure 4: A demonstration of how to use a logical test to insert comments without asterisks into a dBASE II program.



TALL TREE SYSTEMS

INTRODUCING

JRAM-2

THE ONLY TWO MEGABYTE MULTI-FUNCTION BOARD

Break through the 640K-byte memory barrier! Put two MEGABYTES of RAM *plus* all the most popular I/O functions—serial ports, parallel ports, and clock/calendar—in a single PC slot! Includes JETDRIVE RAM disk and JSPOOL printspooler.

JRAM-2 OPTIONS

JRAM-2 0K	\$219
JRAM-2 0K, Clock/Cal	\$299
JRAM-2 0K, Serial, Parallel ports, Clock/Cal	\$399
JRAM-2 0K, Two Serial ports	\$349
JRAM-2 0K, Two Serial ports, Clock/Cal	\$399
JRAM-C (For Columbia PC) 0K, Clock/Cal	\$249

MEMORY

64K chips \$50/Bank
256K chips \$500/Bank

DOS 2.0, 2.1 SOFTWARE

JETDRIVE	\$60
WINDRIVE	\$60
JFORMAT-2	\$60
JSPOOL	\$60

TALL TREE SYSTEMS

1032 ELWELL COURT, SUITE 124
PALO ALTO, CA 94303
(415) 964-1980

CIRCLE 487 ON READER SERVICE CARD

PROGRAMMING

data entry). The ABSTRKEY database, which is in the secondary region, maintains pointers to the primary database. Its structure is

```
KEYWORDS, C, 77
BEGIN, N, 5
END, N, 5
```

The BEGIN and END fields contain the record numbers in the primary database that pertain to a keyword or set of keywords.

Fixing a Database Structure

dBASE II performs updates in place during an APPEND or EDIT operation, but it is not religious about updating the DBF header record (containing the count of the number of records in the database) at every opportune turn. An outdated header record can also result from power interruptions. The inevitable result is the error message "RECORD OUT OF RANGE."

Fortunately, fixing the DBF record count is a simple matter once you understand that the count is the second and third byte (expressed in hex, least significant byte first) in the DBF file. For example, if there are 780 records in the database (hex equivalent 030C), the second and third bytes in the DBF file should be 0C and 03, respectively.

Normally, the header record can be fixed with the following dBASE II commands:

```
USE badfile
```

```
10 'DBFIX.BAS to fix number of records in a DBF file
20 ' Patch suggested by Ashton-Tate
30 INPUT "Enter (in CAPS) fully qualified name of DBF file";badfile$
40 OPEN "R",#1,badfile$,3 '3 is record length, default=128
50 FIELD #1,1 AS dummies, 2 as recnum$ 'Alloc space in rdm buff
60 GET #1,1 'Read record into random buffer
70 PRINT "Old number of records is ";CVI(recnum$)
80 INPUT "Change to what number";goodnum%
90 ' Convert number and move data into random buffer
100 LSET recnum$=NKIS(goodnum%)
110 PUT #1,1 'Write the record back
120 SYSTEM
```

Figure 5: A BASIC program that will repair damaged dBASE II file headers.

COPY TO temp

The COPY command causes the correct number of records to be written to TEMP.DBF. Later, you can simply rename the TEMP file to your original database name or USE TEMP and copy it back to the file.

Alternatively, you could physically change those two bytes in the DBF file with DEBUG. The problem with this approach is that DEBUG and the DBF file must fit in available memory. For very large DBF files, you can use the BASIC program in Figure 5 to make the change.

So far, I've covered how to write tight code in command files, make the most of the REPORT FORM command, use extensive comment lines without asterisks, handle arrays with macros, and fix database structures. In the next issue of PC, I'll take a shot at explaining how to automatically invoke a command file and how to unload a database in comma-delimited form for use by programs such as MailMerge, DataStar, and various BASIC programs. ■

P. L. Olympia is a scientist with a doctorate in chemical physics whose hobby is computers. He is president of Darwin Systems, Inc., a Gaithersburg, Maryland, computer consulting firm. He is chairman and magazine editor of the SAS International Micro Users' group and operates a bulletin board and software exchange system at (301) 963-6894.

DISK MECHANICTM

The ULTIMATE Backup, Analyze & Repair Utility
The Disk Toolkit NO IBM PC Should be Without
Protects Your Software Investment

BACKUP TOOLS: FILE TOOLS:

- Can Backup Most Every Diskette
- SUCCEEDS where others fail!
- Works Manually or Automatically
- Create "Protected" Diskettes
- Many Additional Analysis Tools
- Show Disk & File Allocation
- Display & Alter File Data
- Repair Damaged Diskette
- Recover Erased Files
- Alter "Hidden" Status
- Search Files For Data

SECTOR TOOLS:

- Examine/Print Sector Data
- Modify (ZAP) Sector Data
- Compare, Copy & Zero Sectors
- Search Sectors For Data

HACKER TOOLS:

- Modify Floppy Disk Controller Parameters
- Supports All FDCR/W Commands

DISK MECHANIC works with all standard IBM PC disk formats including "protected" diskettes with mixed track and sector sizes, blank and high track formatting, CRC errors, and single or double sided drives. DISK MECHANIC requires an IBM PC with 128K of memory or COMP-64 with 16K of memory, DOS 1.10, and 2 floppy disk drives. DISK MECHANIC includes a detailed 48 page instruction manual. To Order DISK MECHANIC send check or money order for \$70 plus \$3 for shipping (Mass. res. add sales tax.) to: MLI MICROSYSTEMS, Box 825, Framingham, Mass. 01701 or Call (617) 886-2055 for Mastercard or VISA orders. Dealer/Distributor inquiries welcome. ©1983 MLI MICROSYSTEMS.

MLI MICROSYSTEMS

CIRCLE 340 ON READER SERVICE CARD



Precision Data Products
P.O. Box 6367
Grand Rapids, MI 49506
Outside U.S.A. (616) 652-3457
Michigan 1-800-832-2468
Outside Michigan 1-800-256-0028

3M Brand Diskettes @

+ Toll-Free Ordering =

Error Free Performance

Our
New Low
Prices!



Precision Data's Prices

Unlimited Warranty on All 3M Diskettes

\$1.75

Boxed

3M 5 1/4" Diskettes

Single Sided - Double Density
Reinforced Hub (RH)

Per Diskette (orders of 50 or more)

\$1.65

Bulk with Env.

Double Sided - Double Density - Soft or Hard Sector

DS - DD - RH Boxed \$2.27
DS - DD - RH Bulk with Envelope No 3M Logo \$1.97
DS - DD - 96 TPI - RH Boxed \$3.16

3M Head Cleaning Diskette Kit \$21.00

FREE SHIPPING WITH DISKETTE ORDER.

Use on a regular basis to eliminate perils of dirt, dust and oxide that accumulate with normal use of your system; helps eliminate downtime and service call interruptions. GOOD FOR 30 CLEANINGS

3M Certified Data Cartridges

DC 300KL \$20.85
DC 800KL \$23.05

COMPLETE LINE OF 3M DATA RECORDING PRODUCTS

Bulk Diskettes sold in multiples of 50. Boxed Diskettes, multiples of 10. Shipping & Handling: \$3.00/100 or fewer Diskettes, \$3.00/5 or fewer disks cart rdgcs. Continental U.S.A. MI Residents, add 4% Sales Tax. C.D.D. - add \$2.00. MINIMUM ORDER: \$50.00.

ORDER NOW!

WE WILL NOT BE UNDERSOLD!

CIRCLE 154 ON READER SERVICE CARD

WANTED

"Buyers, & We'll pay the shippin"

CALL FREE (800) 654-4058

"Call For Reduced Prices At Various Quantities"

Verbatim.	Dysan	3M Scotch
5 1/4" sin-side 2.40	5 1/4" sin-side 3.20	5 1/4" sin-side 2.20
5 1/4" dbl-side 3.45	5 1/4" dbl-side 4.25	5 1/4" dbl-side 3.20
5 1/4" sin-side 3.20	5 1/4" sin-side 4.25	5 1/4" sin-side 3.20
5 1/4" sin-side 4.40	5 1/4" sin-side 4.95	5 1/4" sin-side 3.25
5 1/4" sin-side 4.40	5 1/4" sin-side 4.95	5 1/4" sin-side 3.25
8" sin-side 7.20	8" sin-side 8.45	8" sin-side 3.20
8" sin-side 7.20	8" sin-side 8.45	8" sin-side 3.20
8" sin-side 7.20	8" sin-side 8.45	8" sin-side 3.20
8" sin-side 7.20	8" sin-side 8.45	8" sin-side 3.20
Head Cleaning Kits... 5.00	We Stock "Bulk-Packaged" Diskettes	Disk Minder • Smoked Plastic • Holds 75 Disks 16.75 ea
Refills 9.55		

Prices per ea.
10 per box

the **Diskette ConnectionTM**

P.O. Box 1674
Barnaby, CT
06810



(Continental U.S. only. Add 3% on orders under 40%)

? HELP-WP

► ATTENTION WRITERS:

BLACK & WHITE

► Allows user to see 12 PAGES OF LAYOUT ON THE SCREEN AT THE SAME TIME!

► Works with DOS format text files from most word processors and editors on the IBM PC, XT, & Jr.

► Configures to the major printer control commands of your word processor.

► Faster than printing—saves time and paper

► An indispensable aid in formatting tables and illustrations.

► Print layouts on the Epson printer equipped with graphics option.

► Color - Graphics adaptor required.

25.00 check or money order

CHELSEA-SKYE

PO BOX 634

SOCORRO, NM 87801

CIRCLE 170 ON READER SERVICE CARD

In BASIC LANGUAGE: For PC products, our DRIVE & Hardware & Software Specials from

HARDWARE

ALLOY
Cartridge back-up system for PC/XT and compatibles 16.5 meg on a single cart. 1795.00
Interface card included

AST RESEARCH
AST 6-PACK PLUS multi-function board for IBM-PC 64K-384K expandable memory, calendar, 1 serial and 1 parallel port, includes Super Drive and Super Spool software (optional game port adapter is available).
6-Pack Plus 64K 269.00
For game port option add 34.95
64K RAM set to upgrade memory by 64K 59.00

MICROSOFT
New! Mouse with software 129.95

QUADRAM QUADBOARD
Quadboard is expandable from 64K-256K, 1 serial port, clock calendar and quadmaster software incl. 64K Quadboard 259.50
256K Quadboard 399.00

New Expanded Quadboard, expandable from 64K-384K, 1 parallel 1 serial and game port I/O bracket and quadmaster software
64K quadboard 264.95
384K quadboard 569.00
QUADLINK allows running of Apple II software on IBM-PC 439.00

STB
RIO PLUS Multi function board 64K-384K asp. memory, 1 serial 1 parallel and game port (game port cable included) clock calendar and PC Accelerator software.
Rio Plus 64K 254.95

MOUSE SYSTEMS
Mouse with popup menu Design your own menus for most programs software included (requires RS-232 port) 189.95

PRINTER BUFFERS
PRACTICAL PERIPHERALS-Print buffer connects between your computer and printer (cable required from computer to buffer)
32K in-line parallel with copy feature 199.00
64K in-line parallel with copy feature 244.95

QUADRAM MICROFRAZER
Parallel printer buffer with copy feature
MP-16 16K (upgradeable) 139.00
MP-64 64K (upgradeable) 195.00
MP-256 256K (upgradeable) 595.00

TALLGRASS
Hard drive sub system with backup TG-3012 12 mg. w/backup 2995.00
TG-3020 20 mg. w/backup. *Special!*
Interface for PC included
DC-600 Data cartridge 34.95

CURTIS
PC-II Pedestal for IBM monochrome display 54.95
AD-1 Adapter for use of PC-I with Princeton or Quadrome color monitor 7.95
UNI-V Universal fit and swivel base for use with monitor 36.95
EC-1/3 monochrome extension cable 36.95
EC-II 3'-9" coiled keyboard extension cable 27.95

DISPLAY CARDS
HERCULES Graphics Card (Monochrome) 339.00
PLANTRONICS Color Plus 369.95
New! STB GRAPHX PLUS II (Color & Monochrome) 359.95

MODEMS
HAYES MODEMS
Smartmodem 300 199.00
Smartmodem 1200 489.95
Smartmodem 1200B Internal with Smartcom II 419.95

VEN-TEL MODEMS
PC Half Modem Internal 300/1200 modems fits in short slot of XT with Crosstalk XVI 449.00
1200 Plus External 300/1200 modems 389.95
(Requires RS-232 Card and Cable)

MONITORS
AMDEK
300G-12" Green 139.95
300A-12" Amber 154.95
310A-10 (to use with IBM Monocard) Amber 169.95
Color II Plus-12" Hi-res RGB Color Call
HX-12 Hi-res RGB Color 469.95
MAX-12 Monochrome (to use with Monochrome Card) Amber 179.00

TAXAN
420-12" super hi-res RGB color 449.00
122-12" Amber for PC (requires monochrome card) 159.00
121-12" green for PC (requires monochrome card) 169.95

PRINTERS
OKIDATA
OKI-92 Call
OKI-93 New Low Price!
OKI-84 New Low Price!
OKI-82 324.00

PANASONIC
KXP-1090 80 CPS FRT 289.00
KXP-1091 120 CPS FRT Call
EPSON
RX-80, RX-80 FRT Call
FX-80, FX-100, MX-100 Call

QUADRAM
Quadlet Color ink Jet Printer 599.95
ACC Kit for PC (Cable req.)
Parallel Printer Cable for PC 26.95
DIABLO
630 API Letter Quality *Special!*
Tractor Feed 269.00
Parallel Cable for API to PC 45.00
Sheet Feeder 479.95

NEC
3580 letter quality 33 CPS 1625.00
2050 letter quality, 18 CPS 894.95
Tractor Feed 3580/2050 209.95

SIEMENS
6100 18 CPS Letter Quality Call
SILVER REED
EXP-550 (18 CPS) 519.95
EXP-770 (30 CPS) 679.00
Tractor Feed for EXP-770 124.95

BROTHER
HR-15 13 CPS 399.00
HR-25 23 CPS 589.00
Tractor Feed 124.95
Single Sheet Feeder 224.95

TOSHIBA
P1051 Printer 1399.00

TEXAS INSTRUMENTS
855 with Tractor Feed 669.95

A-B PARALLEL PRINTER SWITCH BOX
Cables to Printers included 1134**
(Cable from Computer to A-B Box not included)

FLOPPY DISKS
(Packed 10 per box)
IBM 5 1/4" 34.95
MAXELL 5 1/4" 23.95
FUJI 5 1/4" *Special!*
TDK 5 1/4" 23.95
NASHUA 5 1/4" 17.95

HARDWARE

VEN-TEL
Hayes Compatible Internal Modem for IBM PC 300/1200
Baud Auto Dial Auto Answer *Call for Super Price!*

PERSYST TIME SPECTRUM
Memory Expansion 64K-384K, Parallel and Serial, Clock/Calendar and Software **\$259⁹⁵**

DIABLO 630 API
40 CPS Letter Quality Printer, Supports all Word Proc. Functions. Bold, Underline Sub and Superscript **\$1499⁰⁰**

FUJI 5 1/4" FLOPPY DISKETTES
(Box of 10)
MD-1D Single Sided DD. **\$19⁹⁵** MD-2D Double Sided DD. **\$29⁹⁵**

AST MONOGRAPH PLUS
Monochrome Card Lotus 1-2-3 Graphics compatible. Parallel, Serial Port and Clock/Calendar **\$409⁹⁵**

TALLGRASS TG-3020
20 mg. Hardfile System w/Cartridge Backup **\$3295⁰⁰**

SOFTWARE

DIGITAL RESEARCH
Concurrent CP/M w/windows 229.00
CP/M 86 35.00
DR LOGO (req. color card) 64.95
C-Compiler (PC DOS) 219.00
For other DR products CALL

FUNK SOFTWARE
Sideways 45.00
FOX & GELLER
Quick Code (MS DOS) *Special!*
Dutil (MS DOS) *Special!*
OZ (256K) (req. color card) *Special!*
Gdreh (requires color card) 149.95

HARVARD SOFTWARE
Harvard project manager 259.95

HARVARD ASSOC
PC Logo req. 128K/color card/99.95

HERITAGE SOFTWARE
Smarty 49.95

HUMAN EDGE
The Management Edge (128K) 165.00
The Sales Edge (128K) 165.00

IUS
Accounts Receivable 289.95
Accounts Payable 289.95
General Ledger 289.95
Order Entry 289.95
Payroll 349.95
Easywriter II System 189.95

KNOWARE
Knoware (requires color card) 64.50

KRELL
SAT 195.00

LIFE TREE
Volkswriter Deluxe 164.95

LIVING VIDEOEXT
Think Tank (requires 256K) 134.00

MECA
Andrew Tobias Managing Your Money (128K) 144.95

MICRO DATA BASE SYSTEMS
Knowledge Man *Special!*

CONCENTRIC DATA SYSTEMS
C.I.P. Concentric Information Processor 249.00

CONTEXT
MBA (requires 256K) 429.00

DOW JONES
Connector 39.95
Market analyzer (requires color card) 259.00
Market manager 219.00
Market microscope *Special!*
Spread sheet link 179.95
Investment Evaluator 109.95

DAYFO
Daytlo (XT/256K) 299.95

RESOLUTION is to PROGRAM and MONITOR savings.

47th Street Computer (through August 31, 1984)

SOFTWARE

KNOWLEDGEMAN

Data Base Manager **\$274⁹⁵**
FREE K Paint & K Graph w/Knowledgeman ('325 Value) Ltd. Qty.

MICRORIM RIM R-BASE 4000

Relational Data Base **\$289⁹⁵**

PROFESSIONAL SOFTWARE

Word Plus PC with BOSS, Built-in Online Spelling System
\$289⁹⁵

FOX & GELLER

OZ (Req. 256K and Color Card) HIGHLY RATED **\$209⁹⁵**

FOX & GELLER

Quick Code Fox D Base II **\$144⁹⁵**

DUTIL (w/Purchase of Quick Code) **\$24⁹⁵**

SORCIM SUPERCALC 3 **\$169⁹⁵**

DOW JONES MARKET MICROSCOPE **\$249⁹⁵**

MICRO PRO

Wordstar Professional includes
Wordstar, Mailmerge, Corrector,
Star Index and Training Disk **\$58.95**
Wordstar 3.3 **\$58.95**
INFOTAR PLUS Version 1.5 **\$48.95**
Includes Star Burst!

MICRORIM

Rbase 4000 (req. 256K) **\$139.00**
Extended Reportwriter **\$6.50**
Clout **\$139.00**

MICROSOFT

Multiplan **\$129.95**
Micro Assembler **\$8.50**
C. Compiler **\$325.00**
Word w/Mouse - Version 1.1 **\$288.95**
Word - New Version **\$239.95**
Fortran Compiler **\$224.95**
MS PASCAL Compiler **\$194.95**

MICROSTUF

Crosstalk XVI **\$99.95**

MONOGRAM

Dollars & Sense **\$104.00**

OPEN SYSTEMS ACCOUNTING

General ledger **\$439.00**
Accounts receivable **\$439.00**
Accounts payable **\$439.00**
Payroll **\$439.00**
Inventory **\$439.00**
Sales order processing **\$439.00**
BI 286-D required to run **\$149.95**

SAVE!! Order 3 or more
Open System accounting modules
at once and deduct \$10.00
per module (\$1 286-D not included)

OSPREY ACCOUNTING SOFTWARE

General ledger **\$219.00**
Accounts receivable **\$219.00**
Accounts payable **\$219.00**
Inventory **\$219.00**
Sales invoicing **\$219.00**

PBL CORP

Letterform 1000 DOS 1.1 **\$4.00**
Letterform 1000 DOS 2.0 **\$4.00**
Personal Investor **\$124.00**

PC SOFTWARE

PC Crayon **\$29.95**
Executive Picture Show **\$124.95**

PETER NORTON

Norton Utilities **\$49.95**

PROFESSIONAL SOFTWARE

Word Plus PC with BOSS **\$289⁹⁵**

ROSE SOFT

Prokey 3.0 **\$4.00**

SOFTSTYLE

SET-FX + (Epson printers) **\$49.95**

SOFTWARE INTERNATIONAL

Open Access (requires 256K/color card) **\$379.95**

MULTIMATE

Multimate Vers. 3.22 **\$269.95**

SOFTWARE PUBLISHING

PFS File **\$89.95**
PFS Report **\$79.95**
PFS Graph **\$89.95**
PFS Write **\$89.95**

SS

Word Perfect with Speller **\$269.95**

SORCIM

Supercalc¹ **\$289⁹⁵**

CBS SOFTWARE


Managing for Success **\$9.00**
People Management **\$9.00**
Micro SpeedRead **\$7.50**
Mastering The SAT **\$9.50**



VISICORP

VisiCalc 4 **\$179.00**
VisiWord Plus w/Spell **\$139.00**
VisiFile Vers. 3.0 **\$9.95**
Visi Trend/Plot (requires color card) **\$69.95**

VM COMPUTING

Relay communication software **\$9.00**

● No surcharge for credit cards. 

● Prompt and efficient service.  

● Extensive inventory of PC products.

● Knowledgeable and experienced sales staff.

We stock an extensive inventory on IBM PC[®], XT[®], Apple[®], Franklin[®], Kaypro[®], Compaq[®], Hyperion[®], Columbia[®], Olivetti[®], Eagle[®], etc.

Remember Our Name — It's all the Memory You Need.

47st. Computer
Computers and Business Equipment

A Division of 47st. Photo Inc.

67 W. 47th St. • 115 W. 45th St.
New York, N.Y. 10036

Mail Order Address:

36 E. 19th St., N. Y., N.Y. 10003
212-260-4410

TOLL-FREE
OUT-OF-STATE **800-221-7774**

STORE HOURS:

Sunday 10-4, Monday-Thursday 9-6, Friday 9-2

We accept MC, Visa, American Express & personal checks (will not cause delays if approved). Minimum shipping and handling \$4.95. Software found to be defective will be replaced immediately. Defective hardware will be repaired or replaced at our discretion within the warranty frame of manufacturer. Defective items must be sent to 32 East 19th Street, New York, N.Y. 10003, Attn: Service Dept. Prices herein are for mail order and phone orders only. Store prices may differ. Some items are subject to availability. Due to manufacturers specifications, the prices may change beyond our control. This ad supersedes all other ads.

Keep in touch with the latest items on the market and our up-to-date sale prices by checking our weekly ads in the National editions of the N.Y. Times and Wall Street Journal.

¹IBM[®] is a registered trademark of International Business Machines Inc.

CIRCLE 112 ON READER SERVICE CARD

COMPUCLASSICS

SOFTWARE

ALPHA SOFTWARE	
ELECTRIC DESK	\$199
DATA BASE MANAGER II	175
ASHTON TATE	
D BASE II	299
D BASE III	399
FRAMEWORK	399
FRIDAY	189
CONTINENTAL SOFTWARE	
HOME ACCOUNTANT PLUS	82
PROPERTY MANAGEMENT	295
DIGITAL RESEARCH	
C BASIC COMPILER	360
PASCAL MT+	360
C	209
FOX & GELLER	
QUICKCODE	165
GRAFOX	165
LIFETREE	
ADVANCED VOLKSWRITER	169
LIVING VIDEOTEXT	
THINK TANK (IBM)	119
THINK TANK (MAC)	78
LOTUS DEVELOPMENT CO.	
1-2-3 (Version 1A)	309
SYMPHONY	CALL
1-2-3 UPDATE TO SYMPHONY ..	CALL
MICRO DATA BASE SYSTEMS	
KNOWLEDGEMAN	285
K. GRAPH	130
K. PAINT	59
MICROPRO	
INFOTAR	239
WORDSTAR	235
WORDSTAR PRO-PAC	345
MAILMERGE	129
CORRECTSTAR	129
PLANSTAR	289
MICROSOFT	
MULTIPLAN	125
WORD	239
WORD AND MOUSE	299
BASIC COMPILER	249
PASCAL COMPILER	249
FORTRAN COMPILER	265
BASIC INTERPRETER	265
MICRORIM	
R BASE 4000	289
CLOUT	129
EXTENDED REPORT WRITER	89

SATELLITE SOFTWARE INTL.	
WORD PERFECT	\$279
PERSONAL WORD PERFECT	99
SOFTWARE PRODUCTS INTL.	
OPEN ACCESS	349
SORCIM	
SUPERCALC II	159
SUPERCALC III	229
MULTIMATE INT.	
MULTIMATE	279
SOFTWARE PUBLISHING	
PFS REPORT	69
PFS FILE (IBM)	85
PFS FILE (APPLE)	89
PFS GRAPH (IBM)	85
PFS GRAPH (APPLE)	89
PFS WRITE (IBM)	85
PFS WRITE (APPLE)	89
LEADING EDGE SOFTWARE	
WORDPROCESSOR	85
WORDPROCESSOR/MERGEPRINT ..	105
NUTSHELL	275
WOOLF SOFTWARE	
MOVE-IT	85
MICROSTUF	
CROSSTALK	109
INFOSCOPE	125
PEACHTREE	
PEACH PAK 4	229
PEACH TEXT 5000	229

HARDWARE

HAYES	
SMARTMODEM 300	205
SMARTMODEM 1200B (with SMARTCOM II)	419
SMARTMODEM 1200	485
HERCULES GRAPHICS CARD	349
C. ITOH	
PROWRITER 8510	339
PROWRITER 1550	829
STARWRITER 40CPS	1100
STAR MICRONICS	
GEMINI 10X	285
GEMINI 15X	419
AST RESEARCH	
MEGAPLUS 64K	269
SIX PAC PLUS 64K	269
OKIDATA	
MICROLINE 82A	329
MICROLINE 92	453
MICROLINE 93	695

INCREDIBLE PRICES WITH PROFESSIONAL SUPPORT!

- Corporate Accounts Welcome
- We Accept VISA & MasterCard
- No Credit Charge Surcharge
- Free Technical Support

HOURS

Order Desk & Technical Support Open:
8 a.m. to 6 p.m. Monday thru Friday
10 a.m. to 2 p.m. Saturday

SHIPPING

\$4 per item UPS surface (\$8 for Blue Label); printers \$25

TO ORDER CALL:

1-800-328-4473 or (818) 705-1895 (CA.)

6860 CANBY STREET (SUITE 109) RESEDA, CA 91335
TLX 292415 KET UR

TERMS

ALL prices subject to change. We honor Cashiers Check/MO/Bank transfers immediately. Allow time for company & personal checks to clear. California residents add sales tax.



The Independent Guide to
IBM Personal Computers

1 Please indicate which of the following microcomputers you currently own and/or plan to buy in the next 12 months.

	Own	Plan to Buy
IBM PC	A	G
IBM XT	B	H
PCjr.	C	I
3270 PC	D	J
XT/370	E	K
Other (specify)	F	L

2 For what, if any, business application(s) do you use the microcomputer you currently own?

101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125
126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175
176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200
201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225
226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275
276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325
326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375
376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425
426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475
476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525
526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575
576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625
626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675
676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725
726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775
776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825
826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875
876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900

PLEASE PRINT CLEARLY—Use only one card per person.

NAME _____ PHONE NO. (____) _____

COMPANY _____ TITLE _____

ADDRESS _____ APT. _____

CITY _____ STATE _____ ZIP _____ PC8/21-2

(Zip code must be included to insure delivery)

4 ☐ Please send me 1 year (26 issues) of PC Magazine for \$29.97 and bill me. (Full 1 year subscription price of \$34.97.)



The Independent Guide to
IBM Personal Computers

1 Please indicate which of the following microcomputers you currently own and/or plan to buy in the next 12 months.

	Own	Plan to Buy
IBM PC	A	G
IBM XT	B	H
PCjr.	C	I
3270 PC	D	J
XT/370	E	K
Other (specify)	F	L

2 For what, if any, business application(s) do you use the microcomputer you currently own?

101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125
126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175
176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200
201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225
226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275
276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325
326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375
376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425
426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475
476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525
526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575
576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625
626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675
676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725
726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775
776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825
826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875
876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900

PLEASE PRINT CLEARLY—Use only one card per person.

NAME _____ PHONE NO. (____) _____

COMPANY _____ TITLE _____

ADDRESS _____ APT. _____

CITY _____ STATE _____ ZIP _____ PC8/21-1

(Zip code must be included to insure delivery)

4 ☐ Please send me 1 year (26 issues) of PC Magazine for \$29.97 and bill me. (Full 1 year subscription price of \$34.97.)



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 27346 PHILADELPHIA, PA

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. BOX 13848
PHILADELPHIA, PA 19101



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 27346 PHILADELPHIA, PA

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. BOX 13848
PHILADELPHIA, PA 19101



PC Product Index

RS# PRODUCT ADVERTISER PAGE#

DISK OPERATING SYSTEMS

391 Calcent Mark Williams 80
118 Xenix Santa Cruz Operator C-2

ACCOUNTING

260 Business SW H & E Computers 396
* Multiplex Microsoft 44-45

INTEGRATED ACCOUNTING PACKAGES

263 Integrated Accounting Macola Inc 349
165 Lois-Modell Mod Tech International 38

COMMUNICATIONS SOFTWARE

182 The Odd Couple Roage River Software 303
326 Crosstalk Micro Staf Inc 346
122 Cruise Softach Microsystems 1
122 Easy Link (IMM) Western Union Corp 110

TERMINAL EMULATORS

185 Data Taker Waterfall 63
166 E-M 100 Diversified Computer Systems 346
107 Smartcom/PC Peruch 242
* PC to Mainframe Link IDE Associates 18-19

OTHER UTILITIES

142 Copy II PC Central Point Software 294
131 Xero Copy Vertex Systems 97
127 Backroads Morningstar Systems Inc 395
133 File Connection Flagstaff Engineering 304

FINANCIAL PLANNING SOFTWARE

306 Sideways Peak Software 94
497 Personal Finance MST Spectrum Software 341

GRAPHICS SOFTWARE

145 Chartmaster/Signmaster Decision Resources 8-9
134 Energraphics Electronics Research Inc 56
* Graphics IDE Associates 18-19

RS# PRODUCT ADVERTISER PAGE#

PROJECT MANAGERS

* Project Scheduler Soft Corp 112-113
45 Pro-Ject 6 Soft Corp. Inc 387

SOFTWARE FOR PROFESSIONALS

* Sublock Borland International 43
120 Northeastern S/W Northeastern Software 319
128 Telesoft Telesoft 281
493 It's My Business Quest Research 29

ENGINEERS/SCIENTISTS

131 8087 Chip Microsoft 75
497 Engineering Software Spectrum Software 341

STATISTICAL SOFTWARE

222 P.C. Statisticians Human Systems Dynamics 368
193 Statpro Wadsworth Professional SW 201

WORD PROCESSING SOFTWARE

117 Telex Ann Arbor Software 32
170 Black & White Chelsea Skye 355
173 Word File Connection Flagstaff Engineering 304
357 Office Writer Office Solutions 23
149 Word Perfect Scanline Software Int'l (SSI) 10
125 Syntax W.P. Syntax Incorporated 350

WORD PROCESSORS

148 wordMARK Mac Software 20

MULTIFUNCTION SOFTWARE

136 Assistant Series IBM Software 24-25
272 Smart Software System Integrative Software 108-109
* PCjr Booster Microsoft 21
152 Tasc Master ProSystems 99
461 SyncMac Systemate 90
190 MS-DOS Software Unipress Software 307
158 Author Wacom Software 326

EDUCATIONAL SOFTWARE

106 The Word & Topics Bible Research Systems 96

PC PRODUCT INDEX

RS#	PRODUCT	ADVERTISER	PAGE#
-----	---------	------------	-------

ENTERTAINMENT SOFTWARE

153	Infocom Line	Infocom	376
R8	Gau	Spectrum Holobyte, Inc.	217

TRAINING SOFTWARE

109	Typing Instructor	Individual Software	65
-----	-------------------	---------------------	----

COMPILERS

*	Turbo Pascal Compile	Borland International	53
---	----------------------	-----------------------	----

INTERPRETERS

276	PC/Forth	Laboratory Micro	385
-----	----------	------------------	-----

PROGRAMMER'S TOOLS

452	Birvine	Soft Craft Inc.	249
-----	---------	-----------------	-----

DATA BASE MANAGERS

209	D Base III	Ashdon Time	2-3
192	Sen/Mirge Tools	Computer Control Systems	302
300	Coder Jr.	Coador Computer Corp.	280
198	PCFocus	Information Builders	367
525	Knowledge Man	MDBS	302-303
160	Powerbase	Powerbase Systems	261
493	"It's My Business"	Quest Research Inc.	29
*	Pls. file	Software Publishing	375

PROGRAM DEVELOPER/GENERATOR TOOLS

150	Tools	Blaise Computing	164
371	Basic C	C Source	388
127	Procon/	Morning Star Systems Inc.	395

TEXT EDITORS

182	SFF-PC	Rogue River Software	303
-----	--------	----------------------	-----

RS#	PRODUCT	ADVERTISER	PAGE#
-----	---------	------------	-------

OTHER UTILITIES

211	Crypt Master	Digital Signature	382
340	Disc Mechanic	MLJ Microsystems	355
346	Power Utilities	Norton Utilities, The	385
156	Copywrite	Quad Software Ltd.	388
252	Smart Key II	Software Research Technologies	17
119	Nicoprint	Spies Lab	296
487	J Format	Tall Tree Systems	354

HARDWARE

161	XPC	XDS Manufacturing	346
-----	-----	-------------------	-----

IBM PC COMPATIBLE COMPUTERS

*	Compaq Plus	Compaq Computer Corporation	150-151
216	Compaq PC	Compaq Data Systems	196-197
370	IBM PC Compatible	Sengco	55
375	Tava-Capital Letters	Tava	277
347	Televideo PC	Televideo Systems Inc.	240-241

ACCESSORY CARDS

521	Quadlink	Quadram Corp.	22
-----	----------	---------------	----

MULTIFUNCTION BOARD

108	Stapalplus	AST Research	800-801
516	Baby Blue II	Micromig	288
412	Blossom	Orchid Technology	205
512	Multifunction Boards	Peryst	232-233
334	AST Boards	Quint Distributing Inc.	11
430	Super Rio	STB Systems	C-3
501	Multi Function Boards	Tecmar Inc.	114-115
207	Ultapack	Tsing Labs Inc.	231

VIDEO/GRAPHICS BOARD

139	Hi Graphics I and II	Applied Computer Products Corp.	46-47
103	Monograph Plus	AST Research	27
*	Hercules Graphics CD	Hercules Computer Technology	61
*	Network Color Card	Remous Computer Technology	3
502	Graph Muz NES Cys	Tecmar Inc.	C-4

OTHER ACCESSORY CARDS

486	Multi Display Card	Pandua Systems	306
487	JRAM	Tall Tree Systems	354

PC PRODUCT INDEX

RS#	PRODUCT	ADVERTISER	PAGE#
-----	---------	------------	-------

EXPANSION UNITS

349	Memory Expansion Kit	Janeco Electronics	349
-----	----------------------	--------------------	-----

INPUT HARDWARE

*	Peppad	Concept, Inc.	72
---	--------	---------------	----

INTERFACE DEVICES

110	SCSI	Innovative Data Technology	266
-----	------	----------------------------	-----

MASS STORAGE HARDWARE

194	PC Backup	Alley Computer Products	300
164	Storage Subsystems	Exorex Systems, Inc.	234
186-187	Disk Drives	Interface	264
437	Current	Maynard Electronics	285
384	Qube Hard Disk Drive	Qube Distributing Inc.	239
354	Q430 Surface Tape	Quantum Research	366
396	Beta Plus	RP Marketing Corp.	34
210	Hard Disk Controller	Zabex	247
*	Disk Drive	IDC Associates	18-19
437	10 Megabyte Winchester	Maynard Electronics	285
437	30 Megabyte Apollo	Maynard Electronics	285

MODEM

126	A.J. Connection	Anderson Jacobson	82
171	PC/Intel/Modem	Buzcomp Corp.	166-167
135	Tide Modem	Code A Phone	252-253
303	Smartmodem	Hayer Microcomputer Products	144-145
308	Comet's Family	Quadrant Corp.	70-71
227	Qube Modem Card	Qube Distributing Inc.	36-37
464	PC Modem Half Card	Ven-Tel	28
*	Modem Cards	IDC Associates	18-19

NETWORKING

104	PC Networking	AST Research	250
219	Multi Link	Davong Systems Inc.	34
*	Networking	IDC Associates	18-19
183	The Data Tailor	Worshaker Inc.	63

OTHER COMMUNICATIONS HARDWARE

444	IRMA/Imalme	Digital Communications Assoc.	30-31
-----	-------------	-------------------------------	-------

RS#	PRODUCT	ADVERTISER	PAGE#
-----	---------	------------	-------

DISPLAYS/MONITORS

299	PGS Monitor	Princeton Graphic Systems	257
-----	-------------	---------------------------	-----

PRINTERS

14	Printers	Canon Computers & Peripherals	74
208	Berthier HR-25	Dynas	26
283	IBM Plug 'N' Play	Okidata	224

DAISY WHEEL

270	Daisy Wheel Printer	Jals Industries of America	168
-----	---------------------	----------------------------	-----

PRINTER DRIVERS

318	Printer Boss	Connecticut Software	389
316	Printer Boss	Connection Software	290
317	Printer Boss	Connecticut Software	236

DISKETTES

*	Diskettes	Back Mfg.	369
137	Diaphone Memory Disk	Devotion Computer Supplies	207
*	Diskettes	Diskette Connection, The	355
154	3M Diskettes	Precision Data Products	355

OTHER SUPPLIES

172	Dust Covers	Compatible Corp.	42
121	Dust Covers	Consuepary Computerware	349
146	Computer Supplies	Eick-Tek	97
225	PC Support	Immac.	343
167	Printer Switch	Intex Computer	343
454	Wax Ties	Naturex	374
383	Qube Keyboards	Qube Distributing Inc.	89

LITERATURE

157	Ashton Tate Books	Ashton Tate	226
515	Periodicals	Data Sources	311
415	Warner Books	Warner Software, Inc.	84-87

ORGANIZATIONS AND SERVICES

226	Comp Info Network	CompuServe	215
*	Computer Insurance	Safeware	182

The publisher does not assume any liability for errors or omissions in the product index.

QUENTIN



QUENTIN! DESIGN WITH THE USER IN MIND... *Quality, Reliability, Value...Compatibility*

QUENTIN Winchester Disk Drives and Streamer Tape Backup Systems (Q-700, Q-500, and Q-400) were all designed to provide the Apple, Franklin, and IBM-PC user with reliable and flexible mass storage systems.

QUENTIN gives you a choice. Go with up to 20 MB of hard disk, the Q-500, add a streamer tape backup, the Q-400, now or later. Or, you can go with both capabilities built into one convenient unit, the Q-700.

QUENTIN gives you 100% software compatibility with all popular operating

systems for the Apple and IBM-PC, plus high speed, high quality performance through extremely fast Direct Memory Access.

QUENTIN's easy to use features and advanced software engineering allows the system to grow with your needs.

QUENTIN systems' bottom line is simple and straightforward... quiet quality, reliability, and high performance at a reasonable price... QUENTIN!

For more information see your local computer dealer. Or, phone or write Quentín.

Quentín Corporation, 9207 Elton Ave., Chatsworth, CA 91311/(818) 709-6500
Dealer Inquiries Invited.

Quentín is a registered trademark of Quentín Corporation. / Apple is a registered trademark of Apple Computer, Inc. / Franklin is a registered trademark of Franklin Computer Corporation. / IBM-PC is a registered trademark of International Business Machines, Inc.

CIRCLE 354 ON READER SERVICE CARD

ONE LANGUAGE. ONE SOLUTION.



PC/FOCUS

PUT THE DATABASE POWER OF A MAINFRAME IN YOUR PC.

Now you can turn your Personal Computer into a mainframe-level applications development system with **PC/FOCUS**, the most powerful DBMS available for your PC.

As a tried-and-proven, user-friendly, 4th generation system, **PC/FOCUS** gives you the ability to query and report from files, build systems and manipulate data. It incorporates a relational database, screen manager & report writer, and offers dramatic abilities in graphics, financial modeling and statistical analysis.

But unlike older database technologies which require training and practice to master, **PC/FOCUS** uses simple English

statements you can learn in minutes! In fact, just a few moments of familiarization with **TableTalk**,[™] its new natural language window, is all that's needed for even a novice to become immediately productive.

Best of all, **PC/FOCUS** lets you download data extracted from mainframe files and DB's, then upload data and procedures from the PC to the mainframe for production execution. So your PC becomes almost as powerful as a mainframe, and you become almost as capable as a trained systems analyst.

Let **PC/FOCUS** with **TableTalk**[™] unlock the mainframe power hidden within **your PC**. For de-

tails, fill out and mail the coupon or write to **Don Wszolek, Dept. P15, Information Builders, Inc., 1250 Broadway, New York, NY 10001.**

Dear Don;
Yes! I'd like to unlock the mainframe hidden in my PC with **PC/FOCUS**. Mail full details to:

NAME _____
COMPANY _____
TITLE _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____
TELEPHONE _____

INFORMATION BUILDERS, INC.

New York: (212) 736-4433 • Washington, D.C.: (703) 276-9006 • St. Louis: (314) 434-7500 • Chicago: (312) 789-0515
Dallas: (214) 659-9890 • Palo Alto: (415) 324-9014 • Los Angeles: (213) 615-0735 • Houston: (713) 952-0260

Dealer inquiries invited.

NEW PC STATISTICIAN™

A POWERFUL,
NEW STATISTICS PACKAGE
FOR THE IBM PC

Are you tired of complicated data input and analysis specification on mainframes? Do you need data management, reports, statistics on unlimited cases? Are you ready to do professional statistics in your own office within minutes?

Let PC STATISTICIAN™ do the work for you.

EASY TO USE

PC STATISTICIAN™ is flexible and sophisticated, yet simple to use. Follow the examples in the manual, then start analyzing experimental or survey data immediately.

CHOOSSES CASES AUTOMATICALLY

To get reports on your data, specify the analysis, then the variables and variable levels. If you have all of your data in a single file, PC STATISTICIAN™ can choose the records and variables for your analysis automatically. It even handles missing data automatically.

COMPREHENSIVE

You will be able to carry out virtually all of your data analysis with this one package. PC STATISTICIAN™ includes

- Research data base
- Search & select on 1-4 variables
- Crosstabulation on 1-5 variables
- Descriptive statistics
- Frequency distribution
- T-tests
- 1-way anova
- Nonparametrics
- Correlations
- Curvefitting
- Multiple regression
- Contingency tables
- Data transformations
- Graphics

PC STATISTICIAN™ comes with a 10 day money back guarantee. This is the first program in The Statistics Series™ for the IBM PC, IBM PC, PC DOS, 128K, 2 DSDD Disk Drives. **\$300.00**

CIRCLE 222 ON READER SERVICE CARD



HUMAN SYSTEMS DYNAMICS

To Order—Call
Toll Free (800) 451-3030
In California (818) 993-8536
or Write

HUMAN SYSTEMS DYNAMICS

3613 Avenida Elero, Suite 222, Dept. 1

Northridge, CA 91324

Dealer Inquiries Invited

EDITED BY PAUL SOMERSON

User-to-User

PC readers use this forum to help one another by passing along their questions, solutions, comments, and complaints.



TREE Is Tops

Recently, while compiling a program, I was surprised to see a Disk Full error message. What made this message unusual was that I was using an XT. While it's true that 10 megabytes isn't really all that much space (the equivalent of a mere 28 360K floppies), now that Tallgrass and others are pushing svelte 70-meg units (National Memory offers half a gig—watch for a review in an upcoming issue), I really filled this XT up fast.

One of the reasons is that since old reliable WordStar 3.3 can't handle paths, you either have to stick its 92K on every subdirectory, or do all your editing on its one subdirectory and keep swapping text files back and forth. The rumored next incarnation of WordStar will no doubt support paths; MicroPro's fine new CorrectStar spelling checker uses them.

If you edit with a word processor such

as WordStar that generates automatic backup (.BAK) files, you'll soon find your disks littered with old backup versions of your files you really don't need any longer. It's pretty simple to wipe them all out by typing:

DEL *.BAK

but this works only on the disk or subdirectory you're currently logged into. It doesn't save all that many keystrokes, but I have a batchfile called BAK.BAT with that one line in it. I just tap in BAK and the dross vanishes. If you have an XT, you can end up with dozens of .BAK files scattered across forty or fifty subdirectories. It's a genuine pain to have to find every subdirectory, log into it, erase the extraneous files, find the next one, log into it, and so on, unless you have a way of doing it automatically.

The batchfile KILLBAK.BAT in Figure 1 will do this all for you, if you're using DOS 2.0 or 2.1. To run this file, you have to have KILLBAK.BAT, BAKCLEAN.BAS (see Figure 2), TREE.COM, and BASICA.COM all on the drive you want to tidy up. (You can use BASIC, but I erased it a long time ago. BASICA does everything BASIC does, and it takes up only a bit more space, so why bother with a less versatile version?)

If any of these four files is missing, the batch file will tell you so, and stop working. If they're all there, however, it will run TREE.COM, which lists all the directory paths on your drive, then redirect the

USER-TO-USER

```

ree ***** This will delete all *.BAK files on your disk
pause **** Hit Ctrl+Break if you want to quit before deleting any files!
ree ***** Don't worry if you see "File not found" messages -- that's normal
echo off
if exist TREE.COM goto baecheck
echo on
ree PUT TREE.COM ON YOUR DISK AND START AGAIN
echo off
goto bye
:baecheck
if exist BASICA.COM goto bakcheck
echo on
ree ***** PUT BASICA DR YOUR DISK AND START AGAIN
echo off
goto bye
:bakcheck
if exist BAKCLEAR.BAS goto start
echo on
ree ***** PUT BAKCLEAR.BAS DR YOUR DISK AND START AGAIN
echo off
goto bye
:start
echo on
ree ***** CREATING LIST OF SUBDIRECTORIES . . .
echo off
TREE 1>BAKDEL.FIL
echo on
ree ***** STRIPPING OUT EXTRANEOUS CHARACTERS . . .
echo off
BASICA BAKCLEAR
echo on
ree ***** ERASING ALL *.BAK FILES IN ALL DIRECTORIES . . .
ree ***** Remember, it's normal to see "File not found" messages !!
echo off
ERASEBAK
:bye

```

Figure 1: Main KILLBAK.BAT batch file.

```

100 ' BAKCLEAN.BAS -- This file reads the BAKDEL.FILE
110 ' created by redirection of TREE.COM, then writes
120 ' subdirectory names to third file for DEL *.BAK
130 OPEN "BAKDEL.FIL" FOR INPUT AS #1
140 OPEN "ERASEBAK.BAT" FOR OUTPUT AS #2
150 INPUT #1,AS
160 IF LEFT$(AS,5)<<CHR$(10)+"Path" THEN 180
170 PRINT #2,"DEL ";RIGHT$(AS,LEN(AS)-7);"\*.BAK"
180 IF NOT EOF(1) THEN 150
190 PRINT #2,"DEL *.BAK"
200 CLOSE
210 SYSTEM

```

Figure 2: BASICA BAKCLEAN.BAS file that reads the redirected TREE.COM output and generates a batch file called ERASEBAK.BAT.

output of TREE into another file called BAKDEL.FIL (Figure 3). It will then load and run a BASICA program, called BAKCLEAN.BAS.

BAKCLEAN looks at the file created by the redirected TREE, strips out everything but the paths (with their accompanying backslashes), and creates another file, called ERASEBAK.BAT, that will do the actual erasing. It then returns to DOS.

Since the batch file is still in control, DOS executes ERASEBAK (Figure 4), which goes into every directory and sub-

directory one-by-one and deletes any file with a .BAK extension. You can adapt this technique to do similar tasks that require snooping in every subdirectory. Just change the BAKCLEAN.BAS file to create a batch file that contains the DOS commands you want.—P.S.

DOS Redirection Bug

The KOPY.BAT file presented in a recent "User-to-User" column (PC, Volume 3 Number 8) is not only very useful, but illustrates an interesting bug in DOS 2.0.



BEST BUY!

\$1.74

Single Sided
Double Density

Soft sector 5 1/4" flexible diskettes

\$2.24

Double Sided
Double Density

*Complete with hub reinforcing rings, Tyvek sleeves, color coded user labels, and write protect tabs.

Quality you expect at a price you don't.

Proven quality at a great price. BECK offers you a full satisfaction money-back guarantee — you can't lose! If you like the quality of 3M, Dysan, Verbatim, et al, you'll like BECK.

- Satisfaction, Money-Back Guarantee
- 100% Certified, 100% Error-Free
- Full 7-Year Warranty
- Tested and Retested 21 Times to 42 Rigid Specifications
- Meets or Exceeds ANSI Standards

For IBM, Apple, TRS, and 97% of popular computers.

Order Toll Free 1-800-232-5634.
Available in 25-Pack only plus freight.
Bulk product inquiries welcome.

COD'S CASH ONLY
Corp. Accts Welcome



**Order Now Toll Free
Door to Door in 48 hrs.**

1-800-BECK

(In New Hampshire call 924-3821)

MICRO MART™ STRICTLY BUSINESS AT A DISCOUNT

floppy disk drives

TANDON TM 100-2 FULLY IBM PC COMPATIBLE

\$209

1/2 HT. DISK DRIVES TOP NAMES

SOUTH'S LARGEST SUPPLY • DEALER INQUIRIES INVITED . . .

IBM

\$179

networking/protocol conversion

PC Turbo by ORCHID

80186 Co-processor Board • Speeds Up PC 5 Times

IRMA REPLACES 3278's WITH PC's /IRMA LINE

PC Blossom 84-386K Multifunction Board

BLUE LYNX 5251/3276 EMULATOR

FORTE DATA 3278/3279 Emulator w/SHG, Plus Graphics Capability

SNA & BISYNC • 3780, 5251, 3274

hard disks

Peachtree
Peripherals

P-10

Industry's Best Buy • 10 Meg/F.
Auto Boot • Ram W/Disk Ext. Power
Internal or External Installation

printers

AMDEK AMPLLOT II Supports LOTUS 1, 2, 3 Graphics **\$799**
Houst. Inst. Plotters & Digitizer **CALL!**

SYSGEN 10 & 20 MEG/F W/Streamer Tape **CALL!**
INFAX Barocut Box • 10 MEG Removable Cartridges • Double Drives . . . **CALL!**
DAVONG 10 MEG/F (15, 21, 35 Available External) **CALL!**
SYSGEN IMAGE Streamer Tape Back Up For Your IBM XT **CALL!**

ALL NAME BRANDS AVAILABLE NOW! BEST PRICES!
IF YOU DON'T SEE IT— **CALL!**

multifunction boards

ULTRA PAK Monographs • Serial Ports • Par. Port Expand. RAM (384K) • Floppy Cont. • Opt. Color **CALL!**
#1-384K 84-384K • Clock Ser. & Par Pts Best Price!
#1 MultiCard Mac: B Func (84-512K) Best Price!
#1 I/O Card Ser. Ch. Spooler Ram Disk (Opt 2nd Ser. Par & Game) Best Price!
QUADBOARD New Version 84-384K **CALL!**
CAPTAIN 84-384K **\$289**
SEATTLE RAM + 3 0-256K • Ser • Par Flash Disk • Ch • Spooler **\$199**
J-RAM II 512K Multifunction **CALL!**
PROFIT Systems 84-512K RAM Plus & Elite **\$299/\$880**
BABY BLUE II 84-256K • 250K • Par • 2 Ser • Ch RAM Disk • Spooler • Extra Software Best Price!
PC Blossom ORCHID's 8-Pak Clone with Optional PCnet Piggy Back **starting at \$275**
MAYNARD SANDSTAR Floppy & Hard Disk Controller Cards Best Price!

monitors & crt's

PGS-MAX 12 Amber • Runs off IBM Mono Card • 720h • 350v **Best Price!**
PGS SR-12 890h480 • Non-Interlaced Mode RGB With Res Text, W/Disk Scan Cd **Best Price!**
PGS-HX 12 Hires 680 Dot RGB **Best Price!**
QUADCHROME Hires RGB **Best Price!**
AMDEK COLOR II+ **\$399**
AMDEK COLOR IV 720 Dot **\$549**
AMDEK 300 A/300G 12" **\$149/\$139**
AMDEK 310A Amber 12" Improved Alternate to IBM Green Screen **\$185**
Wyse Terminals Wy 300, 100, 75, 60, 50 Extra Line In Stock **Best Price!**

DOT MATRIX

EPSON FX80 & 100 (160 cps) **Best Price!**
EPSON RX80T or F/T **Best Price!**
EPSON RX100 **Best Price!**
EPSON LQ 1500 NEW! Letter Quality in a Dot Matrix **Best Price!**
ProWriter **\$339**
Prism Color IBM's Choice for LESS, 132 Col 1200 cps Color Graphics **\$1495**
OKIDATA 92&93 Opt IBM Proams 160 cps **Best Price!**
OKIDATA ML84 200 cps **Best Price!**
OKIDATA 2410 Pacemark (250 cps) **Best Price!**
TOSHIBA P-1351 & 1340 **Best Price!**
GEMINI Full Line of Star Microdot Prints **Starting at \$285**
T.I. 855 24 WIRE PIN HEAD, NOW IN STOCK! **Best Price!**
NEC P2 & P3 180 cps **Best Price!**
DIABLO P38 (1400 CPS) **\$1895**

LETTER QUALITY

NEC SPINWRITERS 2050, 3550 & 7730 **Best Price!**
DIABLO 620, 630 630 ECS **Best Price!**
C-ITOH Starwriter (40 cps) **\$1055/\$1455**
Printmaster 155 cps
QUME SPRINT 11/40 PLUS **Best Price!**
SPRINT 11/55 PLUS
LQ Feeders Great Cut Sheet Feeders for NEC 3550 & C-ITOH Starwriter **SAVE!**

chips

CALL FOR QUOTE ON QUANTITY CHIP PURCHASES

INTEL High Speed Math Coprocessor **\$175**
64K RAMCHIPS **\$55/\$159**
(64K-8 Chip/Upgrade Kit) (128K-27 Chip/Upgrade Kit)

Atlanta, Charlotte, Washington D.C.,
Tampa, Ft. Lauderdale, Orlando, Louisville

THE SERVICE LEADER ★ CORPORATE BUYERS WELCOME

IBM

software

Infoscope

Critically acclaimed data base
See Sept. June 84,
Vol. 9, No. 6

**Best
Price!**

ACCOUNTING

IUS A.R., A.P., G.L., Inventory, Order Entry, Payroll Starting at **\$299**

Peachtree Accounting A.R., A.P., G.L., Payroll **CALL!**

MISCELLANEOUS

Dow Jones Entire Line Now W/Full Acct., Comm. & Sales Plus. Complementing Fine Sft. Mkt. Pkg. **CALL!**

Open Access Spreadsheet, 3-J Graphics, Word Processor, Time Manager & Comm. in One Pkg. **\$299**

Decision Manager All Now Integrated Software by Peachtree **CALL!**

VisiOn Applications Manager Calc • Word • Graph • Query **CALL!**

FRIDAY! Ashton Tate **CALL!**

QUICKCODE/dGRAPH/dUtil Version 2.1 Supports One Meg RAM on PC **CALL!**

Lattice C-Compilers One Meg RAM on PC **\$299**

MICROSOFT COMPILERS **CALL!**

DIGITAL RESEARCH COMPILERS **CALL!**

Norton Utilities A must for Every IBM PC **\$59**

ProKey 3.0 Rossoft **\$95**

Copy II PC **\$35**

ATI Training Critics Choice Software Tutorials **\$49**

Set-FX PLUS Epson FX Series Control Pkg. **\$45**

Sideways Inverts Printout **\$49**

PC Paint Brush Amazing Mouse Driven Graphics W/Screen Dump Utility **\$129**

Chart-Master/Sign-Master **CALL!**

"CAD Systems" Best Selection Available of Computer Aided Design Graphics **CALL!**

ENERGRAPHICS Hot New Graphics Package **\$269**

modems

HAYES SMARTMODEM 300, 1200 & 1200B **CALL!**

NOVATION MICRO MODEMS, W/Access 1-2-3; Internal w/CrossTalk XVI Starting at **\$99**

RIXON 1200 4800 BAUD • IBM PC Compatible **CALL!**

Signalman Mark XII 300-1200 Direct Connect **\$259**

graphic cards

HERCULES Monochrome Graphics Supports LOTUS 1-2-3 **CALL!**

PLANTRONICS Color+ Bipolar, Super HiRes With Color Magic **CALL!**

Graphics Master Tecmar Color & Mono Graphics Supporting Lotus **Low Price!**

QUADCOLOR I & II Graphics Supporting Lotus **CALL!**

Paradise Sys. Color Graphics/Monochrome Parallel Printer Port **\$379**

STB Graphics Plus Color & Mono Graphics • Par Port RAM Disk • Speaker • Lite Pen Port • Opt. Cn. Cn. **CALL!**

Multigraph 132 Col in Mono W/ Graphics 720h x 350v Color Graphics in 640h x 480v • Opt. Par Port **\$375**

Amdek MAI Color Graphics Monochrome Par Port Par Port 8 Pages Storage MAIL Light Pen Port Super W Color IV **\$345**

Advertised cash prices subject to change without notice.

WORD PROCESSING

MultiMate 3.22 "WANG" Style Word Processor with Spelling Checker & All New Tutorial **\$289**

SAMNA II & III Deluxe Word Processing at Best Pricing **CALL!**

Microsoft Word W/Win Mouse/Fourth Generation Word Processor/Use Up to 8 Windows **CALL!**

VOLKSWRITER DELUXE **\$189**

WordStar ProPack Now W/Free Tutorial! CorrectStar, MailMerge **CALL!**

WordPerfect by SSI • Available Now by Popular Demand **\$299**

Easy Writer II Systems include Speller & Mailer **CALL!**

Peach Text 5000 Personal Productivity Series **\$179**

DATA BASE

HARVARD PROJECT MANAGER **CALL!**

Day Flo Super new data base **CALL!**

R:base 4000 or 6000 Report Writer & Clout Microvsn **\$329**

Power-base GMS Systems/Combination of Relational & Hierarchical Data Base **CALL!**

Knowledge Man Var. 1.06 Now Available for this Highly Acclaimed Data Base **\$295**

dBasell & III Now "C" Language • Standard plus Ashton Tate **CALL!**

SPREADSHEET

MultiPlan Microsoft • New Low Pricing **CALL!**

SuperCalc 3 Superior Graphics to LOTUS **CALL!**

COMMUNICATIONS

CROSSTALK XVI Microsoft **CALL!**

SMARTCOM II Hayes **\$99**

miscellaneous

Keytronics 5151 New Improved **CALL!**

MOUSE Optical Type LOTUS & VisiOn Compatible By Mouse Systems **\$209**

CURTIS Monitor Pedestal Keyboard Extension Cable, Monitor Extension Cable **CALL!**

MICROFAZER (BK 128K) Stack Spooler Starting At **\$139**

BACK UP Power Supply 200/425/625 Watts **CALL!**

ISOBAR Surge Protectors • With Great Filtering Via Isolated Outlet Pairing • 4 & 8 Plug Starting at **\$55**

IBM is a registered trademark of International Business Machines.

Micro Mart is a registered trademark of Micro Mart Inc.

ORDERS ONLY
1-800-241-8149

MICRO MART

TECHNOLOGY CORPORATE CAMPUS
3159 Campus Drive • Norcross, GA 30071

For Information

Technical Support

Telex

1-404-449-8089

1-404-446-3836

880497

magnum p.c.

800-544-4354



GA Residents
(404) 441-3112



4056 WETHERBURN WAY SUITE 205 ATLANTA, GA 30302

PRINTERS

RITEMAN 3 TALK-LIKE EPSON BUT FASTER BEST PRICE
C. ITOM LETTER QUALITY.....CALL
OKIDATA ALL MODELS.....CALL
NEC SPINWRITERS, P2 & P3.....CALL
EPSON MX, FX, RX.....CALL
TI 855.....NOW IN STOCK
TOSHIBA P1351 & P1340.....CALL
SILVER-REED.....SAVE

DISK DRIVES

TANDON 1M100-2.....CALL
10 MEG HARD.....1395
QUADDISK 6 MEG REMOVABLE.....CALL
TECMAR 5 MEG REMOVABLE.....CALL
IDEA 5 MEG REMOVABLE.....CALL
MICRO SCI (FOR APPLE).....CALL
QUENTIN (FOR APPLE & IBM).....SAVE
TALLGRASS HARD DISK WITH BACKUP.....CALL
IOMEGA BERNOLLI BOX (20 MEG).....CALL
SHUGART HARD DISKS & CONTROLLERS SAVE

COMPUTERS

EAGLE PC'S.....SAVE
IBM PC YOU CONFIGURE.....CALL
SANYO MBC.....NEW LOW PRICES
TAYA PC.....MORE PC FOR LESS

BOARDS

QUADRAM ALL PRODUCTS.....CALL
AST SIX PAC PLUS.....275
IRMA 3278 EMULATOR.....BEST PRICE
HERCULES GRAPHICS CARO.....CALL
TECMAR ALL PRODUCTS.....CALL
IDEASSOCIATES ALL PRODUCTS.....CALL
MA SYSTEMS PC PEACOCK.....CALL
PERSYST.....CALL

MONITORS

TAXAN 105 AMBER / 100 GREEN.....109/104
420 IBM RGB LOOK ALIKE.....CALL
RGB-III SUPER HI RES.....CALL
AMDEK 310 DIRECT PLUG IN - A OR C.....CALL
300 AMBER / GREEN.....154/144
QUADRAM D114CHROME.....CALL

MODEMS

NOVATION - ACCESS 1-2-3 w/ CROSS-TALK VCL.....CALL
SMART CAT 300/1200.....CALL
J-CAT 300.....117
APPLE-CAT 300/1200.....CALL
HAYES SMART MODEM 300/1200.....212/499
1200B.....CALL
ANCHOR SIGNAL MAN MARK VII/XII.....CALL

SOFTWARE

D-BASE.....355
WORDSTAR.....CALL
EASYWRITER.....CALL
FRIDAY.....194
MULTIPLAN.....CALL
LOTUS 1-2-3.....SAVE
ULTIMATE.....CALL
KNOWLEDGEMAN.....CALL
10 BASE.....CALL

ACCESSORIES

STANBOY POWER SYSTEMS.....BEST PRICE
SWITCH BOXES PARALLEL & SERIAL.....SAVE
CHIPS 64K.....55
MICROFAXER PRINT SPEEDER.....FROM 127
COMPUERVE STARTER KIT.....32

DISKETTES

	CASE 100	BOX 10
VERBATIM SS/DD	180	24
VERBATIM IS/DD	300	36
MAXELL SS/DD	220	27
MAXELL IS/DD	330	39

AVAILABILITY AND PRICES SUBJECT TO CHANGE

APPROVED CORPORATE ACCOUNTS WELCOMED

CIRCLE 366 ON READER SERVICE CARD

USER-TO-USER

DIRECTORY PATH LISTING FOR VOLUME PCMA0

Path: \PROJECT
Sub-directories: None

Path: \DBASE
Sub-directories: None

Path: \TALK
Sub-directories: None

Path: \CALC
Sub-directories: None

Path: \TEMPU2U
Sub-directories: None

Path: \U2U
Sub-directories: U2U2
U2U1

Path: \U2U\U2U2
Sub-directories: None

Path: \U2U\U2U1
Sub-directories: None

Figure 3: Sample redirected TREE.COM BAKDEL.FIL output.

```
DEL \PROJECT\*.BAK
DEL \DBASE\*.BAK
DEL \TALK\*.BAK
DEL \CALC\*.BAK
DEL \TEMPU2U\*.BAK
DEL \U2U\*.BAK
DEL \U2U\U2U2\*.BAK
DEL \U2U\U2U1\*.BAK
```

Figure 4: Sample ERASE.BAT contents.

After keying in this file and using it a few times, I noticed that the destination disk of every disk that was backed up contained a new file called PUT. Using the DEBUG utility to examine this file disclosed that it contained a single character followed by an ASCII carriage return and line feed.

After copying a few more disks and examining the PUT file, it became apparent that the character was whatever I happened to enter in response to the "Strike any key when ready..." prompt. On a hunch that DOS was interpreting the right cursor key in line four as a redirection

command, I changed the line to read "pause ==> Insert a new, formatted disk in the A: drive." Sure enough, now I was getting a new file called Insert on the destination disk. Curiosity satisfied, it was a simple matter to change the "==" to "====" and solve the problem. Apparently DOS 2.0 is not smart enough to treat everything following a pause command as a remark.

Charles W. Rowland
Richardson, Texas

Readers—send us your bugs, especially if you find fixes for them!

Share Your Discoveries

Tell the world about your latest discovery through User-To-User, and we'll pay you \$50 for your trouble plus an extra \$25 of you submit it on a disk.

If you send a disk, please include a printout of your submission to ensure against damage in transit. Mail your contributions to: User-To-User, PC Magazine, One Park Avenue, New York, NY 10016.



NOW AVAILABLE— **THE MASTER DIRECTORY OF PRODUCTS FOR YOUR IBM PC**

Nearly 400 pages of the most current listings and information for IBM PC, PC XT, PCjr and compatible hardware, software, accessories and services—from the publishers of PC.

YOUR PRIMARY REFERENCE...

organizing over 4,000 products and 1,500 vendors, services, and support systems in one comprehensive, easy-to-use guide. PC: THE BUYERS GUIDE is the quickest and most reliable way to locate exactly what you need to expand the usefulness of your personal computer.

Because it's published quarterly in May, August, November and February, PC: THE BUYERS GUIDE is the most up-to-date guide of its kind, accurately describing each product and its function and cost. Find out what level of skill is required to get the most from the product and everything is logically categorized and indexed with cross-references so you won't miss one listing!

GET MORE FROM YOUR PC

The documentation you received from IBM is only the beginning. Finding the right hardware and software is what really makes the difference in how effectively your IBM or compatible PC performs—that's why you need PC: THE BUYERS GUIDE! You'll also find detailed listings for the following important services and accessories:

Consultants	User Groups
On-line Bulletin Board	Insurance Services
Databases	Professional Societies
Furniture	Retail Clubs
Retail and Mail Order Outlets	Computer Groups
Literature	Maintenance services

AND MUCH MORE!

Be sure to order your copy of PC: THE BUYERS GUIDE today—fill out the coupon and mail it now!

PHONE TOLL FREE 9 am-5 pm EST:
1-800-526-0790
(In New Jersey 201-540-0445)

ALSO AVAILABLE AT YOUR LOCAL NEWSSTAND
AND COMPUTER STORE

PC THE BUYERS GUIDE

CN1914, Morristown, NJ 07960

Please send me PC: THE BUYERS GUIDE. Enclosed is \$9.50 (\$7.95* per copy, plus \$1.55 each for postage and handling.) (\$11.00 outside USA, send US funds only). *Residents of CA, CO, CT, DC, FL, IL, MA, MI, MO, NJ and NY State add applicable sales tax.

Charge My:

☐ American Express ☐ Visa ☐ MasterCard

CARD NO. _____ EXP. DATE _____

MR./MRS./MS. _____ print full name _____

ADDRESS _____

CITY/STATE/ZIP _____ INDEX

**LURKING
BEHIND EVERY
COMPUTER
IS THE POWER
TO DESTROY
ITSELF.**

That power cord may look innocent. But it could suddenly turn against your PC.

It could, for example, hurl a power spike from static or lightning into its delicate circuitry. Wiping out its memory. Or destroying a defenseless component.

Don't risk it. Get a 6-outlet Wire Tree Plus™ surge protector from NETWORKX™. It guards against spikes. Filters out RF interference. And it's the only device with two phone jacks to protect modems against surges.

Other unique features include separate switches for the CPU and peripherals and a bracket that

mounts under the front of the workstation.

The illuminated switches are easy to reach, and yet recessed, so you can't accidentally shut down power and lose data.

If you don't need 6 outlets, pick up our 4-outlet Wire Tree™. Or our single-outlet Wire Cube™ that's ideal for portable computers.

That'll take care of power surges. But what if your foot gets tangled in a power cord? Prevent this potential disaster with the Wire Away™. It stores up to four 18-gauge wires and ends the hazardous mess of dangling cords.

All our products are backed by a 5-year warranty. So when you shop for a PC, ask for NETWORKX computer station accessories. And don't go home without them.



NETWORKX

Network, Brooklyn, NY 11237-1567 (212) 521-7555
CIRCLE 454 ON READER SERVICE CARD

THE MOST USEFUL IDEAS ARE OFTEN REMARKABLY SIMPLE.

The first filing system was a remarkably simple way to do incredibly useful things. Like organize a business and make it work.

PFS® FILE and PFS:REPORT are remarkably simple software programs that can help you organize your business faster and more effectively.

And both programs are amazingly easy to learn.

FILE and REPORT were designed for people without computer experience. So all instructions are easy to understand. And you can be productive quickly.

FILE lets you record, retrieve and review information like personnel records and purchase orders. Instantly. You can even cross reference by department or job or however you want.

And you can arrange information in "forms" you design yourself. Or you can take advantage of PFS SOLUTIONS which are pre-designed forms for popular applications like inventory, invoices and ledgers. Either way, you can quickly and easily create the filing system that fits your needs. Not your computer's.

REPORT is the perfect companion program to FILE. Because it gives you the power to summarize and perform calculations on information you've stored with FILE.

With REPORT, you can create presentation quality summaries in table form in just minutes. Automatically sorted, calculated, formatted and printed!

FILE, REPORT and SOLUTIONS are fully integrated with the PFS Family of Software. Which means your computing capabilities can always expand to meet your needs.

PFS: It's the powerful software that's simple to learn. It's the power of simplicity.

See your computer dealer for more details.



PFS SOFTWARE THE POWER OF SIMPLICITY

PFS FILE, PFS:REPORT and PFS SOLUTIONS currently work on IBM® Apple®, Radio Shack, DEC, Hewlett Packard, Texas Instruments, Panasonic and other personal computers. © Software Publishing Corporation

OUR STORIES LACK IMAGINATION.



Because Infocom's interactive fiction is designed to run on *your* imagination.

That's precisely why there's nothing more interesting, challenging or interactive than an Infocom disk—but only after you've put it in your computer.

Once it's in, you experience something akin to waking up inside a novel. You find yourself at the center of an exciting plot that continually challenges you with surprising twists, unique characters (many of whom possess extraor-



dinarily developed personalities) and original, logical, often hilarious puzzles. Communication is carried on in the same way as it is in a novel—in prose. And interaction is easy—you type in full English sentences.

But there is this key difference between our tales and conventional novels: Infocom's interactive fiction is active, never passive. The course of events is shaped by what you choose to do. And you enjoy enormous freedom in your choice of actions—you have hundreds, even thousands of alternatives at every step. In fact, an Infocom



interactive story is roughly the length of a short novel in content, but because you're actively engaged in the plot, your adventure can last for weeks and months.

Find out what it's like to get inside a story. Get one from Infocom. Because with Infocom's interactive fiction, there's room for you on every disk.



INFOCOM™

For your: Apple II, Macintosh, Atari, Commodore 64, CP/M, IBM PC, IBM PC compatible, DEC Rainbow, DEC VT-10, HP 150 & 100, IBM PC* & PC*, KAYPRO II, MS-DOS 2.0*, NEC APC, NEC PC 9000, Osborne, TI Professional, TI 590-4A, Tandy 2000, TRS-80 Color Computer, TRS-80 Models I & II.

*Use the IBM PC version for your Compaq and the MS-DOS 2.0 version for your Wang, Mandrel, Data General System 10, GRID and many others.

MARK ZACHMANN

PC Tutor

Midnight Driver

Q: In "DATE Strikes Out at Midnight" (PC, Volume 3 Number 8, page 414), a reader pointed out a bug in PC-DOS 2.0.



The problem with the DATE routine is that dates aren't always changed when the midnight hour passes.

You said that a new clock driver program is needed to fix the problem. Such a clock driver is available as a piece of public domain software, called CLOCK-FIX.SYS, which is offered through many IBM PC user groups and remote bulletin board services (RBBS) around the country. One source is the bulletin board that I operate, the RBBS of the SIG/M SAS Users Group International, a system with many free public domain programs available 24 hours a day. Its telephone number is (301) 963-6894.

Once you have a copy of this clock driver, install it by adding this line to the CONFIG.SYS file:

DEVICE=CLOCKFIX.SYS

P.L. Olympia
Gaithersburg, Maryland

A: Remote bulletin boards can be treasure-troves of routines for solving specific problems that have plagued you for

months. Readers are welcome to suggest public domain solutions that have helped them. These recommendations are helpful—even in the world of free software, "caveat emptor" is good advice.

Back into the SHELL

Several readers lambasted me for recommending the use of the undocumented SHELL command with DOS 2.0 and BASICA (see "Batch Files in the SHELL," PC, Volume 3 Number 9, page 432). I must apologize: in DOS 2.0, there's a fatal bug that haunts you when you try to perform disk operations after calling the SHELL command.

In DOS 2.1, however, the bug has been fixed, and SHELL is now working and documented in that version of the operating system.

Printing a BASIC Run

Q: I often find it desirable to print out the "run" of a session when I use a BASIC program. On a Apple computer I can do this by typing PR #1, and I can do it on the IBM PC while in PC-DOS by pressing Ctrl-PrtSc. I have not found a method, however, that allows me to print out a run while in BASIC on the PC. Is there a method that would let me do this without leaving BASIC?

Todd Milne
Niantic, Connecticut

A: There are two ways to do it. By far the easiest approach is to purchase PC-DOS 2.0, since the updated operating system has fixed that particular problem. With PC-DOS 2.0 you can push Ctrl-PrtSc while in BASIC and have the run of the session echoed to the printer.

If you're reluctant to spend \$60 to fix this bug, you could change all PRINT statements to LPRINT statements. You can do this easily if you have a text editor. Just

SHELF CONSCIOUS?

Now you can organize your copies of
PC MAGAZINE

Now your magazines can be a handsome addition to your decor, well organized, and easy to find, thanks to these durable library-quality cases or binders. They're made of luxury-look leatherette over high-quality binder board. And both styles are custom-designed for this or any other magazine you save, with size, color and imprint selected by the publisher. FREE transfer foil included for marking dates and volumes.



Magazine binders

holds your issues on individual snap-in rods, combining them into one volume. \$7.95 each, 3 for \$22.50, 6 for \$42.50. Mixed titles OK for quantity prices.



Open-back cases

store your issues for individual reference. \$6.95 each, 3 for \$19.75, 6 for \$37.50. Mixed titles OK for quantity prices.



For faster service,
CALL TOLL-FREE
800-526-0790
(In NJ only 201-540-0445)

PC Magazine	
P.O. Box 5120, Philadelphia, PA 19141	
Please send <input type="checkbox"/> Cases <input type="checkbox"/> Binders	
TITLE	QUANTITY
PC Magazine	
Other _____	
<input type="checkbox"/> PAYMENT ENCLOSED \$ _____ * Add \$1.00 per order for postage and handling. Outside USA add \$2.00 per unit ordered. SEND US funds only.	
<input type="checkbox"/> CHARGE (Minimum \$100)	
<input type="checkbox"/> American Express <input type="checkbox"/> MasterCard	
<input type="checkbox"/> Visa	
Card No. _____	Exp. Date. _____
Signature _____	
Print Name _____	
Address _____	
City _____	
State/Zip _____	
*Residents of PA add 6% sales tax	

save your BASIC program as an ASCII text file by entering a statement like

SAVE "MYPROC", A.

Then use your text editor's search-and-replace feature to change all occurrences of PRINT to LPRINT. If you use PRINT # statements to write to files, however, make sure PRINT isn't changed to LPRINT in these statements.

Fitting GRAPHICS into APL

Q: I do most of my programming in IBM's APL on a 128K IBM PC. To do graphics, I use the BIOS/DOS Auxiliary Processor (AP100). I'd like to use the GRAPHICS program in PC-DOS 2.0 to send graphics I create to my IBM Graphics Printer.

I haven't been able to do this because, apparently, some portion of APL or an auxiliary processor tries to use the same area in memory as the GRAPHICS program. Is there any way that I can use this program in conjunction with APL?

Roy W. Sommers
Pennsville, New Jersey

A: It's more likely that the APL code is overlaying the Keyboard or Print Screen interrupts in memory, rather than overlaying the GRAPHICS program. In either case, after you load GRAPHICS and tap the PrtSc key, the net result is a printout with regular PrtSc characters rather than the superior screen graphics.

To invoke the GRAPHICS program while within APL, you must write a simple auxiliary processor (AP) that you can call, which then calls the GRAPHICS program.

In the following example, I assumed that APL had overlayed the Keyboard interrupt (INT 16h) but not the Print Screen interrupt (INT 5). In this case, an assembly language routine that calls GRAPHICS is:

```
PUSH BP
INT 5
POP BP
```

(This routine can be found on page 6-106 in IBM's DOS 2.0 manual.)

In the other case, where the APL code overlays the Print Screen interrupt in memory, another simple kludge can make the GRAPHICS program work. After you load GRAPHICS, run DEBUG and examine address 0000:0014. This will give you four bytes—an address that shows where GRAPHICS was loaded. Here's an example of what you might enter at the keyboard and read on the screen:

```
A>DEBUG
-DO:14
0000:0014 20 03 56 06
-Q
```

You find the address of the Print Screen interrupt by reading these four hexadecimal values backwards. In the above example, the actual address is 0656:0320. If that was the address you found, you could write this code to call GRAPHICS:

```
PUSH BP
PUSHF
CALL 0656:0320
POP BP
```

Keep in mind that the exact address where GRAPHICS is loaded depends on a variety of factors, including the number of disk buffers and what has been done with the MODE command. Don't include a routine like the one above in a piece of commercial software since the address for GRAPHICS will vary for different users.

Color Defeated

Q: I use the PeachText 5000 package for most of my work, and I can't for the life of me figure out how to make it display anything but a drab white-on-black screen on my RGB color monitor. I'm not after anything fancy—a different foreground color would satisfy me. I can call up color displays from BASIC or with a public domain program that's similar to routines in PC Magazine's ANSI.SYS articles (see the programming columns in PC, Volume 3 Numbers 7 and 8). But no matter how I call for color, every time I access Peach-

Text 5000, the screen immediately reverts to white-on-black.

Is there some way to use ANSI.SYS to put color into PeachText? Or, if prompts to set color can't work with that program, should I assume that key reassignments won't work either?

David Glasser
Arlington, Virginia

A: Although the ANSI.SYS device driver added a large number of capabilities to DOS 2.0, most commercial software packages, including PeachText 5000,

I can't for the life of me figure out how to make my PeachText 5000 package display anything but a drab white-on-black screen on my RGB color monitor.

completely ignore this device driver.

Programs for word processing, spreadsheets, and communications need to perform keyboard and screen operations as quickly as possible. To meet this requirement, for input and output (I/O), most of these programs bypass DOS entirely and handle I/O through the BIOS instead. (BIOS stands for Basic Input/Output System—the word Basic here doesn't refer to the programming language.)

The BIOS is a lower level of system software than the DOS; using DOS insulates the programmer and user further from the hardware. Generally, "the more insulation the better" is a good rule for writing software for the IBM PC, since many PC-compatibles are compatible only at the higher MS-DOS level. Pro-



26 REASONS TO SUBSCRIBE TO



Your subscription will bring you 26 big issues every year of the most up-to-date facts and technological breakthroughs that affect you and your IBM or compatible personal computer. 26 big issues of PC delivered to your door AT UNBELIEVABLE SAVINGS!

Every other week you'll get a library of professional insights including latest coverage of newly-released hardware and peripherals. You'll find timely information on innovations in programming, applications and networking. You'll communicate with professionals and users like yourself and get reviews of new software packages, some before they even hit the shelves.

You can subscribe to *PC*, The Independent Guide To IBM Personal Computers for as little as \$1.02 an issue! Use the attached card or the coupon at right TO SUBSCRIBE TODAY!

GET THE MOST UP-TO-DATE INFORMATION FOR YOU AND YOUR PC WITH *PC*, 26 TIMES A YEAR!

26 SUBSCRIBE TO

P.O. BOX 2443 • BOULDER, CO 80322

26

YES, Please enter my subscription to *PC* for:

- ☐ 26 issues (one year) for only \$29.97...LESS THAN \$1.16 A COPY!
☐ 52 issues for only \$52.97...LESS THAN \$1.02 A COPY!
 Full one-year subscription price \$34.97. Single copy price \$2.50.

Mr./Mrs./Ms.

please print name in full

PC45424

Company

Address

City

State

Zip

Check one: ☐ Payment enclosed ☐ Bill me later

Charge my: ☐ American Express ☐ Visa ☐ MasterCard

Card No.

Exp. Date

Add \$52 a year for postage to Canada and all other foreign countries. Please allow 30 to 60 days for delivery of first issue.

Business as Usual?

Business as usual these days means a computer that's up and "humming." But if your computer were stolen or damaged, you wouldn't have business as usual.

YOU'D HAVE TROUBLE!

You can get fast replacement for your entire system and be back in business in a hurry by protecting your computer with SAFEWARE Personal Computer Insurance. It's the only coverage designed specifically for personal computers used for business—in your office, shop or home.

SAFEWARE protects ALL hardware. ALL purchased software and ALL media against theft, accidental damage, natural disaster, power surge, etc., regardless of use, after a low \$50 deductible.

(Not without your computer it wouldn't be.)

Fast, courteous claims handling prevents your losing valuable business computing time.

Find the premium price for the coverage you need listed in the table below, available for as low as \$35 per year. Fill in the coupon today. Your coverage will begin as soon as your payment is accepted. Or, for even faster coverage, call our toll-free number.

1-800-848-3469

(In Ohio call 1-614/262-0559)

Phones open 8 a.m. to 8 p.m. Monday through Saturday

SAFEWARE

Total Hardware, Media & Annual Software System Value	Annual Premium
Up to \$ 2,000	\$ 35
\$ 2,001-\$ 5,000	\$ 60
\$ 5,001-\$ 8,000	\$ 75
\$ 8,001-\$11,000	\$ 90
\$11,001-\$14,000	\$105

Call toll-free for rates on higher coverage. Coverage differs in Texas.

It is an understanding requirement that you insure your system for its full value. Call for instant rates.

Mail to: SAFEWARE, P.O. Box 02211, Columbus, OH 43202.

Before I'm out of business, please issue my SAFEWARE Insurance Coverage.

Name _____

Street _____

City _____ State _____ Zip _____

System value \$ _____ ☐ Check Enclosed ☐ VISA ☐ MasterCard

Card # _____ Exp. Date _____

Signature _____

No risk. You may return contract for full refund within 10 days. Coverages and units are subject to the terms, conditions and exclusions in the contract.

PCN

PC TUTOR

grams that work exclusively through the DOS can run on a larger range of machines than programs that call on the BIOS or—even worse—that manipulate a particular computer's hardware directly.

There's a speed penalty, however, when a program works through the DOS; you lose a fair amount of versatility as well. Word processors, in particular, would slow down drastically if they used DOS and ANSI.SYS to write text to the screen—so much slower that almost no word processors go through DOS to handle screen output. Communications programs that relied completely on DOS would be limited to 300 baud.

This means that PeachText 5000 is just one of many programs that ignore ANSI.SYS. If such a package offers no built-in way to select screen colors, there's nothing you can do.

The keyboard input situation is a bit different. Going directly to the BIOS for keyboard operations gives only a slight increase of speed. The main advantage here in bypassing DOS is to escape some unfortunate side effects of the DOS keyboard calls. Early versions of DOS were unable to recognize some 2-byte keycodes; this has been solved in later versions of DOS, but the problem lingers on in language compilers that were designed to work around the old operating system's quirks. Another problem is that pressing Ctrl-C will often stop a program dead; on the IBM PC you can get the same effect by pressing Ctrl-Break—a key combination that you're less likely to strike unintentionally.

Some of these problems exist because DOS was designed to be a CP/M-80 workalike. Now, we'd be better off without these "features."

The PC Tutor solves practical problems and explains points of general interest to users of the IBM Personal Computer. If you'd like to see your questions answered in this column, drop a line to PC Tutor, PC Magazine, One Park Avenue, New York, NY 10016.

CRYPT MASTER

Data Security Problems?

Protect the privacy of your disk files and electronic communications with **Crypt Master**.

Using a recent advance in cryptography, **Crypt Master** can render any disk file (including those created by 1-2-3, WordStar and dBASE II) completely indecipherable. User-defined passwords are required to transform an encrypted file back into its original form. Without these passwords, an adversary with access to your IBM PC and all of your diskettes (including **Crypt Master**) would need thousands of years of computer time to read your files.

Crypt Master, an implementation of the RSA Public-Key Cryptosystem, may also be used to securely protect electronic mail against eavesdropping and to generate digital signatures. Only a public-key cryptosystem like **Crypt Master** may be used to safely transmit passwords via telephone lines.

- entirely menu driven
- full documentation
- automatic data compression
- user definable passwords required for decryption, not encryption

Price ranges from \$95 to \$545 (depending on level of security)

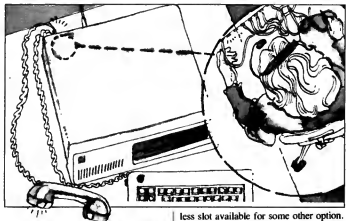
Requires: IBM PC, 128K RAM, 1 disk drive, 80 col. display

Digital Signature

5453 S. Woodlawn
Chicago, IL 60615
(312) 324-6533

Board Modems: The Inside Story

The board modems reviewed here can do everything their standalone cousins can. In addition, they cost less, and they come bundled with communications software.



There are two basic types of modems—standalone modems and board modems—and they have a lot in common. Both make it possible for computers to communicate over phone lines, both have combination 103/212 compatibility (which allows for communication at either 300 or 1200 baud), and both have good points and bad points.

The most obvious advantage of board modems can also be a disadvantage, depending on your point of view. A board modem goes inside your PC. As an advantage, this means one less box cluttering up your desk and one less cable to worry about. As a disadvantage, it means one

less slot available for some other option.

One unarguable advantage of board modems is price. The standalone version of the Hayes Smartmodem 1200 lists for \$699. The board version lists for \$599. And not only does the board version immediately save you \$100, but Hayes also throws in *Smartcom II*, a sophisticated communications program that lists for \$149 if you buy it separately.

The main reason that board modems are cheaper than standalone modems is that they have fewer parts. They don't need a separate box or power supply, and, because they reside inside the computer, there is no point in putting a bank of status lights on them. This leads directly to one

of their disadvantages—namely, if you are accustomed to status lights, you probably depend on them more than you realize and may miss having them.

What this all boils down to is that there is no obvious choice between board modems and standalone modems. Both will do exactly the same job for you, and most manufacturers will happily sell you either kind. I discussed several standalone modems in a previous column (see "Top of the Line Standalone Modems," *PC*, Volume 3 Number 12). Here's a look at four modems-on-a-board.

Hayes 1200B

Hayes Microcomputer Products, Inc.
5923 Peachtree Industrial Blvd.
Norcross, GA 30092
(404) 449-8791

List Price: \$595

Requires: 96K RAM (for *Smartcom II* software).

CIRCLE 793 ON READER SERVICE CARD

Aside from the lack of status lights, the 1200B shares all the features and capabilities of the Smartmodem 1200. As with the 1200, the 1200B has 19 basic commands and about as many registers. These let you control such arcane things as how long to wait for a dial tone in auto-dial mode. Also, like the standalone version, the 1200B has five modes of operation—manual originate, manual answer, auto-

FOR
XPRESS SERVICE,
Toll Free 1-800-632-8515
California 1-714-632-8512

**MICRO
XPRESS**

Special Xpress

64K RAM CHIPS \$32
(Set of 8) 159 NS
64K RAM CHIPS \$40
(Set of 8) 200 NS

DISK DRIVES

For your IBM PC or compatible

5 1/4" FULL HEIGHT DISK DRIVES

TANDON TM 100-2
TANDON TM 101-2
CONTROL DATA 9408

5 1/4" HALF HEIGHT DISK DRIVES

TANDON 58-3
CONTROL DATA 9428
QUINE 140-A
TEAC 558
TEAC 55F

FROM \$169

MONITORS

AMDEK VIDEO 310-A \$175
PBS HK-12 \$470

HARD DISK SUBSYSTEMS

2 INTERFACES

10, 15, 20 & 33MB
MAYNARD
WST, 2, & 3

FROM \$1970

DISK DRIVE CONTROLLERS

MAYNARD

All formats available

FDC (8K*)

FDC (8K*)

FDC (8K*)

MAYNARD

Senditor Series

Modular Controller Cards

FROM \$160

SOFTWARE UTILITIES

TALL FREE

J FORMAT-2 WINDRIVE
JETDRIVE Each \$40

EXPANSION BOARDS

AST RESEARCH

All options available. Expansion memory

Expansive memory

SIX PAK PLUS (64K)

MEGA PLUS II (64K)

VO PLUS II

QUADRAM

All options available. Expansion memory

QUADBOARD

EXPANDED QUADBOARD

QUADBOARD II

FROM \$130

FROM \$240

COLOR/GRAPHICS CARDS

HERCULES

PARADISE SYSTEMS

AST MONOGRAPH PLUS

FROM \$250

Hours: 8 AM - 5 PM Mon.-Fri.
Toll Free 1-800-632-8515
California 1-714-632-8512

TERMS: Prepayment, COD, Visa and MasterCard accepted. Add 5% shipping and handling on all orders. Add 3% surcharge for Visa and MasterCard.

Prices subject to change without notice. 25% restocking charge for all returned items.

TELECOMMUNICATIONS

dial, auto-answer, and reverse auto-dial, in which the modem will dial and then go into answer mode. Another feature on the 1200B is a second jack to plug your phone into.

Because the 1200B has the same set of commands as the 1200, you can use it with any communication program designed to work with the standalone Smartmodem. If you buy the 1200B, Hayes will also throw in its own program, *Smartcom II*, free of charge. *Smartcom II* lets you control the modem through menu choices.

The 1200B comes with two manuals: a hacker-oriented hardware manual, and a user-oriented software manual. If you're more user than hacker, the trick is to read just enough of the hardware manual to get the modem plugged in and working. Then switch to the software manual, which is not only more readable, but also contains a reasonably thorough introduction to the entire field of communications.

Smartcom II requires a minimum of 96K RAM. Older 1200Bs used up two slots in the PC-XT because of the closer slots in the XT. Hayes tells me that the speaker is now slimmer and the board will use only one slot.

Era 2

Microcom, Inc.
1400A Providence Hwy.

Norwood, MA 02062

(617) 762-9310

List Price: \$499

Requires: 128K RAM and DOS 2.x
(for Era 2 software).

CIRCLE 792 ON READER SERVICE CARD

This is my current favorite among board modems because the Microcom Era 2 package is equivalent to the Hayes 1200B and costs \$100 less.

Functionally, the Era 2 modem is virtually identical to the Hayes Smartmodem. The set of commands, the double handful of registers, and the operating modes are all the same. The early version of the modem missed being Hayes-compatible by just enough so that it would not work with Hayes' *Smartcom II*. Micro-

com tells me that this has been corrected and that the Era 2 boards are now completely Hayes-compatible.

As with the 1200B, Era 2 comes with a reasonably sophisticated communications program, also named Era 2. The design of the Era 2 program is significantly different from the *Smartcom II* design, but the capabilities are fundamentally the same.

And Microcom goes Hayes one better in providing a single, integrated manual that tells you everything you need to know about the hardware, the software, and communications. Not only is the information all in one place, but it's presented pretty much in the order you'll probably want to see it.

(For a closer look at the Era 2 package, see "A New Era in Communications," PC, Volume 3 Number 8.)

PC: IntelliModem

Bizcomp Corporation

532 Weddell Dr.

Sunnyvale, CA 94086

(408) 745-1616

List Price: \$499

Requires: 64K RAM and disk BASIC
(for PC: IntelliCom software).

CIRCLE 791 ON READER SERVICE CARD

Very much in the same class with the Smartmodem 1200B and Era 2 packages, the PC: IntelliModem also comes with its own communications program: PC: IntelliCom. Bizcomp's software is written in BASIC and is less sophisticated than Era 2 and *Smartcom II*, but it contains standard amenities such as auto-dial, auto-log-on, and the ability to transfer files directly to and from disk. A nice feature of the PC: IntelliCom program is that it makes it easy to toggle the modem on and off. This allows you to switch between voice communications and computer communications without accidentally hanging up the phone.

The PC: IntelliModem's features are similar to those of the Hayes and Era 2 modems. It even has a "Hayes mode" in which it will obey many of the Hayes Smartmodem commands. But it still is not completely compatible with the Hayes, so

any given program for the Smartmodem may or may not work with the PC-Intelli-Modem. *Smartcom II* seems not to work at all, although *Crosstalk XVI*, another Hayes program, seems to work fine.

A second drawback of the PC-Intelli-Modem is its manual. While it is reasonably well written, it assumes a fair amount of knowledge about communications. If you don't have the background, you may have to work a bit to get through it.

Rixon

PC212A

Rixon Inc.

2120 Industrial Pkwy.
Silver Spring, MD 20904
(301) 622-2121

List Price: \$499; with additional Comm 2 port connector, \$539.

Requires: DOS 2.0

CIRCLE 790 ON READER SERVICE CARD

As with the Bizcomp modem, the Rixon on PC212A has both its own set of commands and a "Hayes mode" in which it obeys most, though not all, Hayes commands. According to Rixon's ads, the PC212A is compatible with "all of the programs written for the Hayes Smartmodem." I found I could make it work with *Crosstalk XVI*, but not with *Smartcom II*. The Rixon PC212A comes with an extremely minimal communications program, lacking any provision for incoming information and saving it to disk. You will quickly outgrow it.

One nice thing about the Rixon modem is that you can get it with an optional asynchronous serial port. This means that your serial printer, for example, can plug into the Rixon modem card and save a slot.

The Rixon manual, like the Bizcomp manual, assumes a fair amount of knowledge about communications. Hackers will be delighted, however, by the wealth of technical information they'll find in it.

This should give you a sense of what's available, and a good start if you're looking for a 103/212-compatible board modem. In a future issue, we'll take a look at a group of 103-compatible modems. ■

TOTAL CONTROL: PC/FORTH™

Complies with the New 83-Standard
**GRAPHICS • GAMES • COMMUNICATIONS • ROBOTICS
DATA ACQUISITION • PROCESS CONTROL**

- **PC/FORTH™**: interactive and conversational, but 20 times faster than BASIC.
- **PC/FORTH™** programs: highly structured, modular, easy to maintain.
- **PC FORTH™**: direct control over all interrupts, memory locations, and i/o ports.
- **PC/FORTH™**: full access to DOS files and functions.
- **PC/FORTH™** application programs can be compiled into turnkey COM files and distributed with no license fee.
- **PC/FORTH™** Cross Compilers available for ROMed or disk based applications on most microprocessors.
- **PC/FORTH™**: compatible with PC/XT, COMPAQ, and all hard disks.
- **PC/FORTH™**: for PC-DOS 1.1 and 2.0, CP/M-86®, Concurrent CP/M.

Trademarks: IBM, International Business Machines Corp., CP/M, Digital Research Inc., PC/FORTH+ and PC/GEN, Laboratory Microsystems Inc.

PC/FORTH™ \$100.00
Includes interpreter/compiler with virtual memory and background multi-tasking, full screen editor, Assembler utilities, 200-page technical manual. Upgrade to PC/FORTH+ available.

PC/FORTH+™ \$250.00
Allows creation of FORTH programs up to 1 megabyte in size.

DEMO DISK \$5.00
Requires graphics card.

Extension Packages

Forth Cross Compiler	\$300.00
Advanced Color Graphics	\$100.00
Intel 8087 Support	\$100.00
Software Floating Point	\$100.00
Interactive Symbolic Debugger	\$100.00
PC/GEN™ Custom Character Sets	\$ 50.00
PC/TERM for Smartmodem	\$ 60.00
QTF+ Editor/Text Formatter	\$100.00
Curry FORTH Programming Aids	\$150.00
Cross Reference Utility	\$ 25.00
B+ Tree Index Manager	\$125.00
B+ Tree File and Index Manager	\$200.00
Intel 8087 Processor	\$200.00
"Starting FORTH" Tutorial	\$ 16.00



Laboratory Microsystems Incorporated
Post Office Box 10430, Marina del Rey, CA 90295
Phone credit card orders to (213) 306-7412



CIRCLE 276 ON READER SERVICE CARD

Oh No!

Your only copy of vital data.

Lost. Gone.

It happens to us all.

The solution is
**file recovery with
The Norton Utilities™**

Oops protection.

A powerful set of programs which provide file recovery, disk exploration and more. Works with DOS 1.00 - 2.10, PC, XT, PCjr, Compaq, Compaq-plus and all full compatibles.

Data Insurance

*File recovery
Disk exploration*

Norton Utilities

And more!



Available from Computerland,
better software dealers,
or order direct, for \$80.

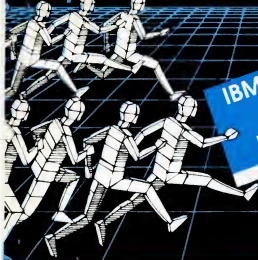
Peter Norton
2210 Wilshire Blvd.
Santa Monica, CA 90403

(213) 399-3948
Visa / MasterCard



CIRCLE 346 ON READER SERVICE CARD

Corporate and Institutional Accounts Welcome



**IBM PCs Available
Call For
New Low Prices**



IBM PC is an IBM trademark

Disk Drives

MAYNARD HARD DISK

• **10 MEGABYTE**
HARD DRIVE w/ SANDSTAR
MULTIFUNCTION CARD (W51) **\$995**

• **10 MEGABYTE**
HARD DRIVE w/ SANDSTAR
FLOPPY DRIVE CONTROLLER
CARD (W52) **\$1159**

• **10 MEGABYTE**
HARD DRIVE s/ SANDSTAR
MEMORY CARD w/ MEM (W53) **\$1159**

TEAC Drives

• **FD 55B**
5 1/4" Double Sided
40 TRK, 48 TPI **\$189**

Control Data Drives

• **CDC 9428**
Half Height Double Sided
40 TRK, 48 TPI **\$189**

• **CDC 9409**
5 1/4" Double Sided
40 TRK, 48 TPI **\$219**

Tandon Drives

• **TM 100-2**
5 1/4" Double Sided
40 TRK, 48 TPI **\$209**

Shugart Drives

• **SA 455**
Half Height Double Sided
48 TRK, 48 TPI **\$189**

Monitors

Princeton Monitors:
HX 12 RGB (690 X 240) **\$489**

SR 12 RGB (690 X 480) **\$Call**

MAX 12 Amber Monochrome Monitor **\$195**

Amdel:
310 A **\$175**

300 A **\$169**

300 G **\$159**

Boards



AST:
Six Pak Plus W/64K Clock Calendar Parallel & Serial
Ports (Options Available: Game Port Upgradeable
to 384K Bytes) **\$259**

Memory 64K (Set of 9 Chips) **\$55**

Mega Plus II W/64K Clock Calendar &
Serial Port (Options Available: Parallel, Game
or Second Serial Port) **\$269**

Hercules:
Graphic Card W/Parallel Port **\$359**

Koala:
Touch Table With Software **\$99**

Paradise Systems:
Multidisplay Card
(Both Color & Monochrome) **\$399**

Persyst
Monochrome W/Parallel Port **\$239**

Quadram:
Quad Color I **\$209**

Quad Color II (Add On) **\$229**

New Expanded Quad Board W/64K
Expandable to 384K, With Parallel,
Serial, Game Port, Clock Calendar 110 Bracket
And Quadmaster II Software **\$269**

Keytronics KB5151 Keyboard **\$239**

Sigma:
Disc Drive Controller **\$179**

Printers

Epson:
RX 80 (100 CPS, PAR-10") **\$Call**

RX 80PT (100 CPS, PAR-10") **\$Call**

FX 80 (160 CPS, PAR-10") **\$Call**

RX 100 (100 CPS, PAR-15") **\$Call**

FX 100 (160 CPS, PAR-15") **\$Call**

LO-1550 (w/parallel interface)
(200 CPS, 67 LQ) **\$Call**

Star-Micronics:
Gambit-10X (120 CPS, PAR-10") **\$Call**

Juki:
6100 (18 CPS, PAR-15") **\$479**

Texe Instruments:
TM55 W/Tractor Feed **\$895**

Okidata:
ML82 (160 CPS, PAR-10") **\$479**

ML83 (160 CPS, PAR-15") **\$679**

ML84P (200 CPS, PAR-15") **\$829**

NEC:
3550 (33 CPS, PAR-16") **\$1689**

2050 (20 CPS, PAR-16") **\$889**

Mannesmann Teley:
Spit 80 (60 CPS, PAR-10") **\$359**

166L (160 CPS, SER & PAR-15") **\$629**

Modems

Hayes 300 Baud **\$209**

Hayes 1200 Baud **\$489**

Hayes 1200 B Board **\$439**

Novation Smartcat 103/212 **\$399**

TERMS AVAILABLE FOR CORPORATE AND INSTITUTIONAL ACCOUNTS

How To Order: Order by calling CompuAdd toll free on 1-800-531-5475 (if outside of Texas) or 1-512-250-1489 (if in Texas). You can also order by mail. Orders may be charged to a MasterCard or Visa account at no extra charge, or paid by Cashier's Check or Money Order. We do accept personal checks. Allow 10 days for check processing. We pay shipping and handling on orders delivered in continental U.S.A. add 5% sales tax if Texas resident. All equipment carries a warranty.

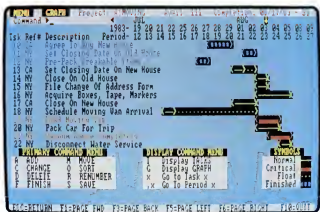
CompuAdd Corp.

ORDER TOLL FREE
(800) 531-5475 (if outside of Texas)
(512) 250-1489 (In Texas)

PLAN YOUR WAY TO PROFITS WITH

PRO-JECT 6 PROJECT MANAGEMENT SYSTEM

HARD DISK SHARING AND NETWORK SUPPORT NOW AVAILABLE
ALSO AVAILABLE FOR PCjr.



Planning, simulating, tracking and reporting are key factors in developing and executing a successful project plan. Manual project management techniques can lead to unrealistic commitments, missed deadlines and cost overruns due to a lack of up-to-date information, inconsistent or incomplete data, and time-consuming preparation of project reports and charts. Changing priorities can lead to summarized reports which are often misinterpreted. If you are having any or all of these problems, consider PRO-JECT 6 from SoftCorp!

PRO-JECT 6 is a powerful color graphics Project Management System for the IBM PC, PC/XT and PCjr systems which automates these activities. It uses Critical Path Method planning techniques and can display and print horizontal bar chart project diagrams and reports. PRO-JECT 6 can help you meet schedule deadlines and stay under budget by giving you a fast and easy way to plan project tasks, do "WHAT IF..." simulations and track and report project status. User-friendly menus and prompts guide you from data entry through reports in just minutes. After every change you make to the project, the new critical path is displayed in seconds.

Use the resource feature to define manpower requirements and costs. Use the programmable reporting system to produce departmental breakdowns, "To-Do" lists and management summaries. Use the output profile feature to preview reports on the screen or to pass reports to SIDEWAYS*, 1-2-3* and WORDSTAR*. Use the new hard disk sharing support to keep projects separated when multiple users share an XT. PRO-JECT 6 was designed to be the easiest to use Project Management System available. You could pay more, but you can't buy a more capable Project Management System for the price of PRO-JECT 6.

PRODUCT	MINIMUM		PRICES
	PC&XT	PCjr	
250 Task Capacity	160K	160K	\$199
150 Task Capacity	128K	160K	\$149
75 Task Capacity	128K	128K	\$99 New!
SIDEWAYS* PRINTING PROGRAM			\$60
Optional Hard Disk Sharing (XT only)			\$35 New!
Demo Disk & Manual			\$25

Check, Money Order, VISA, Mastercard & purchase orders are accepted.

TO ORDER CALL:

1-800-255-PLAN

or (813)-799-3984

or send check/money order. CALL FOR A BROCHURE!

SYSTEM REQUIREMENTS:
IBM PC, XT, PCjr, COMPAQ, EAGLE
CORONA, COLUMBIA, HYPERION
DOS 1.1, 2.0 or 2.1
One double-sided diskette drive
80 column color or monochrome display
Dot Matrix or Daisywheel Printer

SoftCorp INC.

2340 State Road 580
Suite 244
Clearwater, Florida 33575
1-800-255-PLAN
(813)-799-3984

*SIDEWAYS is a trademark of JUNK SOFTWARE
1-2-3 is a trademark of LOTUS DEVELOPMENT CORPORATION
WORDSTAR is a trademark of MICROPRO INTERNATIONAL

Dealer Inquiries Invited

COMING UP



A Member of the Ziff-Davis
Family of IBM PC Magazines

Flight Simulator

America's number one game now comes in a Junior version. PCjr. lets it fly and takes a look at two more simulation games along the way.

Junior at Work

IBM's Cluster Program allows the interconnection of up to 64 computers for business use. Learn how Junior fits in.

New Disk Drives

A second disk drive for your PCjr will prove to you that two heads are better than one.

Word Play

Learn about the text according to New-Word. It might shake your faith in other word processing programs.

Sound Advice

An excerpt from Peter Norton's latest computer book explores the magic and mystery of Junior's three-tone sound capabilities.

Comp-U-Store

An on-line shopping mall for those who'd rather let their fingers do the walking. Plus a visit to the comp-u-store room.

Columns

Editor's Wire by Corey Sandler; Junior Explorer by Peter Norton; Screen Play by Don Kennedy; Opinion by Lindsay Van Gelder and Stephen Manes; Education by Martin Porter; Logo by Winn Rosch; BASIC by John Woram; Communications Networks by Eric Freedman; Reader to Reader by Paul Somerson.

CopyWrite backs up all IBM PC Software.

There are no exceptions. Copy-protected software is copied readily. **CopyWrite** needs no complicated parameters.

Requirements:

IBM Personal Computer or XT.

64k bytes of memory.

one diskette drive.

CopyWrite will run faster with more memory or another drive.

CopyWrite is revised monthly, to keep up with the latest in copy protection. You may get a new edition at any time for a \$12 trade in fee.

CopyWrite is available at a price of \$50 US funds from:

Quaid Software Limited
620 Jarvis Street, Suite 2412
Toronto, Ontario, Canada M4Y 2R8
Telephone (416) 961-8243

CIRCLE 158 ON READER SERVICE CARD

NOW YOU CAN WORK IN C WITH ONLY BASIC KNOWLEDGE



Enjoy the Best of Both Worlds with BASIC.C™

Until now, IBM BASIC and C were about as far apart as apples and oranges — and if you wanted to move from BASIC to C, you had to go back to square one. Not anymore!



Write or Call Collect

C-Source
12801 Frost Rd.
Kansas City, MO 64138

816-353-8808

There's no denying that BASIC is a fine language: it has probably helped you learn a lot about programming computers. But now that you know how to program, isn't it time to take the next step — to a language that was designed to help you quickly develop software that is fast, compact, and portable?

BASIC.C can help you make the transition smoothly: It's a library of C functions providing BASIC's high level capabilities you've come to know so well. Functions for string handling, sequential and random I/O, graphics, and many more — all designed to look and work like BASIC.

You get the source code to **BASIC.C**, extensively documented, it provides many examples to help you learn how to write C functions, and if a function doesn't suit your specific needs... change it!

C Source provides a complete development package: the **BASIC.C** Library, a full screen editor, and a choice of two C compilers. Buy it all, or just the pieces you need.

BASIC.C Library - source code	\$175
EC - full screen editor	\$ 85
BASIC.C & EC	\$225
BASIC.C & DeSmet C Compiler	\$275
BASIC.C & Computer Innovations C compiler	\$475
BASIC.C, DeSmet C Compiler, & EC	\$325
BASIC.C, Computer Innovations C compiler, & EC	\$525

CIRCLE 371 ON READER SERVICE CARD

COMING UP



A Member of the Ziff-Davis
Family of IBM PC Magazines

Mouse Pop-up Menu Software

Learn how to create customized pop-up menus with Trillian's *VisuALL*, Mouse Systems' *Designer Pop-Up Menus*, or Microsoft's *Mouse Menus*.

IBM Cluster

PC Tech Journal's coverage of linking PCs together continues with a technical review of the Cluster Program, IBM's first offering in the PC-interconnection sweepstakes.

Communications Products from IBM

Two technical reviews will examine version 2.0 of the *Asynchronous Communications Support* and the electronic mail package for the PC, the *Personal Communications Manager*.

Assemblers

Advanced macro techniques using ASM-86, plus macros that allow access to the power of assembly language and the convenience of structured programming, will be explored. Also, a look at Digital Research's PC-DOS assembler, RASM-86.

Memory Management

Acquire a better understanding of one of the most important features of any operating system through this look at how DOS handles memory management.

COMING UP

A LIBRARY OF SOFTWARE PROGRAMS FOR THE IBM PERSONAL COMPUTER



A Member of the Ziff-Davis Family of IBM PC Magazines

Curve Fitter

For those who work with mountains of data yet are not mathematically inclined, this program is a lifesaver. *Curve Fitter* helps you assemble and plot a set of data and then determine the relationship among these points. Using the least-squares fit regression method, the program chooses the type of curve that best fits your data and then plots it against the data points. The resulting curve—linear, exponential, second order, logarithmic, or power—helps you make projections. You'll never need to plot with paper, pencil, and eraser again!

Funnels and Buckets

Safeguard your children against math phobia by teaching them to enjoy arithmetic drills. As the clock ticks, the student must solve the equations that fall from a moving funnel. A nasty burglar uses buckets to catch unsolved problems and steal the student's points. To make the game more challenging, parents or teachers can preselect the type of math problems and the speed at which they fall.

War in the Falklands

Imagine you are the commander of Her Majesty's Royal Navy Task Force, and your mission is to recapture the Falkland Islands. You must maneuver and defend 15 ships, 82 planes, and helicopters containing your 1,600 elite troops. Your strategy involves transferring troops from your two assault ships to the East Falkland Island. Then you must respond to your ground commanders' requests by providing air and artillery support. You have 21 days to secure the Argentine surrender!

Print Formatter

Everyone knows that graphics and varied typefaces make printed matter more noticeable and readable. No doubt your own printer can produce a modest number of character variations, but the available choices, and the time required to implement them, are often discouraging. *Print Formatter* simplifies the process by letting you insert single-letter control codes directly into the text. When used with the IBM/Epson or Okidata printers, these codes in turn activate the various printer features. But you do not have to use *Print Formatter's* simplified codes; if you wish to use another printer or print features not in the program, you can use the actual control codes, input either in ASCII form or as the characters themselves. The choice is yours, but the impressive results are the same.

FAST SIDEWAYS PRINTING FOR YOUR EPSON

Now you can print multi-page **spreadsheets** or reports as wide as you like on your FX printer, **sideways** on your paper, in a choice of five different type sizes, at **full text-mode speed**. And you can print in super-fast two-pass dot-matrix **letter quality**. Or create a printer buffer of up to 32K.

Printer Boss™ software also allows full menu-based operation of all control functions of all of the Epson MX, FX and RX printers. **Select** and de-select pica, elite, compressed, italic, enlarged, emphasized, doublestrike, underline, superscript and subscript. **Set** line spacing, right and left margins and skip-over-perforation. **Load** USA, France, Germany, England, Denmark, Sweden, Italy, Spain and Japan language sets. **Control** unidirectional, half-speed and proportionally-spaced printing. **Store and retrieve** 10 complete menu settings with a few keystrokes. **Emulate** the IBM-label printer for the IBM-PC, eliminating character print-out incompatibilities between IBM-PC software and Epson FX printers while retaining full printer versatility. **Download** to FX printers five different **IBM character sets**, including graphics symbols, greek symbols, screen and APL characters. **Print** at full text-mode speed. **Ideal** for **IBM graphics** software, or **screen dumps**, or printing text from **Wordstar**, **Lotus 123** or many other fine programs.

Printer Boss™ for the IBM-PC and compatibles \$59.95. With **Letter Boss™** letter quality or **Sidewick™** sideways print option \$99.95. With both \$139.95. Visa, MC, or send check. Free info. Dealers welcome.

Printer Boss™

CONNECTICUT SOFTWARE
30 WILSON AVENUE
ROWAYTON CT 06853
203-838-1844

SIDEWICK IS NOT TO BE CONFUSED WITH SIDEWAYS, A TRADEMARK OF FUNK SOFTWARE. PRINTER BOSS, LETTER BOSS AND SIDEWICK ARE TRADEMARKS OF SPEER RESEARCH CORPORATION. WORDSTAR AND LOTUS 123 ARE TRADEMARKS OF MICROPRO INT'L CORP. AND LOTUS DEVELOPMENT CORP. RESPECTIVELY.

CIRCLE 318 ON READER SERVICE CARD



CHARGE ORDERS—for your convenience,
PHONE TOLL FREE 800-526-0790. In New Jersey only 201-540-0445.

PC Poster Offer, CN 1914, Morristown, NJ 07960

Please send _____ prints of Mark McCandlish's "Inside the IBM Personal Computer"
@ \$10.00* each plus \$2.50 postage & handling. Outside USA add \$5.00 postage &
handling.

☐ PAYMENT ENCLOSED \$ _____

☐ CHARGE: ☐ Visa ☐ MasterCard ☐ American Express

Card No. _____ Exp. Date _____

Signature _____

Print Name _____

Address _____

City / State / Zip _____

* Residents of CA, CO, CT, DC, FL, IL, MA, MI, MO, NJ, and NY State, add applicable sales tax

**Unique Art Poster Offer—A Cutaway View
of the IBM Personal Computer!**

24" x 32" poster, "Inside the IBM Personal Computer" by Mark McCandlish. Printed
on quality heavyweight poster stock. Only \$10 plus \$2.50 for postage and handling.



Index To Advertisers

RS #	Advertisers	Page	RS #	Advertisers	Page	RS #	Advertisers	Page
114	Advanced Computer Products	76	192	Computer Control	302	134	Enertronics Research	56
113	Advanced Computer Products	394	115	Computer Hut of New England	254	164	Everex	234
194	Alloy Computer Products	300	183	Computer Mail Order	282-283	133	Flagstaff Engineering	304
126	Anderson Jacobson	82	135	Computer Warehouse	278	112	47st Photo	356-357
117	Ann Arbor Software	32	300	Condor Computer Corp.	280	*	Fred Deeg & Associates	351
139	Applied Computer Products Corp.	46-47	316	Connecticut Software	290	306	Funk Software	94
140	Applied Computer Products	106	317	Connecticut Software	236	260	H&E Computronics	396
157	Ashton-Tate	226	318	Connecticut Software	389	303	Hayes Microcomputer Products	286-287
209	Ashton-Tate	2-3	121	Contemporary Computerware	349	163	Hayes Microcomputer	144-145
103	AST Research	27	216	Corona Data Systems	196-197	*	Hercules Computer	61
104	AST Research	250	371	C Source	388	*	Hercules Computer	5
101	AST Research	100-101	515	Data Sources	311	222	Human Systems	368
*	Beck Manufacturing	369	219	Davong Systems	14	136	IBM Software	24-25
106	Bible Research Systems	96	145	Decision Resources	8-9	*	IDE Associates	18-19
171	Bizcomp	166-167	137	Dennison Computer Supplies, Inc.	207	109	Individual Software Inc.	65
150	Blaise Computing Inc.	164	189	Diamond Software	77	153	Infocom	376
*	Borland International	43	444	Digital Communications	30-31	198	Information Builders	367
*	Borland International	53	211	Digital Signature	382	225	Inmac	343
213	Bottom Line	73	*	Diskette Connection	355	110	Innovative Data Technology	266
141	Canon Computers & Printers	74	166	Diversified Computer Systems	349	272	Innovative Software	108-109
142	Central Point Software	294	208	Dynax	26	186-187	Interface	248
170	Chelsea Skye	355	235	Eastern Enterprises	293	167	Intracomputer	343
155	Codaphone Kennedy	252-253	236	800 Software	98	168	Jameco Electronics	349
*	Compaq	150-151	146	Elek Tek	97	270	Juki America	168
228	Compu Add Corp.	386				271	Knowledge Systems	58-59
172	Compucable	42				276	Laboratory Microsystems	385
205	Compuclassics	358				295	Logicsoft	164
234	Compumail	276				282	Logicsoft	48-50
226	Compuserve	215				296	Logicsoft	272
						130	Logic Unlimited	52
						263	Macola Inc.	349

INDEX TO ADVERTISERS

RS #	Advertisers	Page	RS #	Advertisers	Page	RS #	Advertisers	Page
386	Magnum PC	372	124	PC Limited	352	451	Softcorp Inc.	387
148	Marc Software	20	36	PC Link	312	452	Softcraft Inc.	249
391	Mark Williams Co.	80	535	PC Network	244-245	122	Softtech Microsystems	1
437	Maynard Electronics	285	499	PC Warehouse	298	*	Softline	81
290	MCP Applications	92	*	Pconcept	72	453	SOFTMAN	269
525	MDBS	202-203	107	Persoft	242	*	Software Publishing	375
315	Micro Flash		512	Persyst	232-233	252	Software Research Technologies	17
	Computer Systems	165	143	Pipeline Computers	344-345	808	Spectrum Holobyte	217
516	Microlog, Inc.	288	160	Powerbase Systems	260-261	497	Spectrum Software	341
201	Micromail	299	154	Precision Data Products	355	119	Spies Labs	296
162	Micromart	370-371	299	Princeton Graphic		430	STB Systems	
478	Micromart	40		Systems	257		Inc.	C-3
159	Micromart	4	152	Profit Systems	99	125	Syntrex Incorporated	350
337	Microshop	246	366	Progressive Micro		461	SysteMate Inc.	90
*	Microsoft Inc.	21		Distributors	393	487	Tall Tree Systems	354
*	Microsoft Inc.	44-45	521	Quadram Corp.	22	375	TAVA PC	277
422	Micro Storehouse	297	203	Quadram Corp.	12-13	501	Tecmar Inc.	114-115
326	Microstuf, Inc.	199	327	Quadram	70-71	502	Tecmar Inc.	C-4
331	Micro Ware	75	158	Quaid	388	128	Telesoft	281
341	Micro Xpress	384	334	Qubie Distributing	11	347	Televideo Systems	240-241
340	MLI Microsystems	355	383	Qubie Distributing	89	207	Tseng Labs	231
165	MODTECH International	38	384	Qubie Distributing	239	190	Unipress	307
127	Morningstar		227	Qubie Distributing	36-37	464	Ventel	28
	Systems	395	354	Quentin Research	366	132	Vertex	96
454	Network	374	493	Quest Research, Inc.	29	131	Vertex	97
120	Northeastern Software	319	116	Ring King	16	193	Wadsworth Electronic	
346	Norton Utilities	385	182	Rogue River Software	303		Publishing	201
357	Office Solutions	23	396	RP Marketing	88	415	Warner Books	84-87
285	Okidata	224	*	Safeware	382	240	Western Union Corp.	110
412	Orchid Technologies	205	118	Santa Cruz Operator	C-2	138	Wilcom Software	326
351-352	ORYX	78-79	149	Satellite Software		185	Winterhalter Inc.	63
484	Paradise Systems, Inc.	306		International	10	*	Warehouse Software	251
310	PC Brand	116-117	*	Scitor Corp.	112-113	161	X.D.S. Manufacturing	346
339	PC Connection	152-155	370	Seequa	55	210	Zobex	247

YOUR PC IS NOT THE ONLY ONE GETTING THE BYTE (IF YOU'RE NOT BUYING FROM US).

PRICE STOCK SERVICE SUPPORT

We want to help you save money. It's that easy. We don't believe in high prices and fat margins. That's why we're dedicated to give you the **best prices** in the market on **in-stock** items. We believe that a deal is no deal without **follow-up service after the sale**. We warrant **all** products sold for ninety days and have an average turnaround on repairs of less than 48 hrs. **Expert support** is crucial, both before and after the sale. Whether it's a question of basic compatibility, or a tricky installation, the answer is as close as your phone. **CALL FOR PRICES 1-800-446-7995.**

Floppy Disk Drives:

TANDEM T1000 (8MB) 1st choice... \$199
 NET XT OWNERS! Add a 8 drive with our HALF HEIGHT special!! Two half height drives: cable, brackets, 1 year warranty all for just \$340
 Individual HALF HEIGHTS each \$179

Printers:

EPSON FX-80 (80cps, 10")	\$499
EPSON FX-80 (100cps, 15")	\$699
EPSON RX-100 (100cps, 10")	\$279
EPSON RX-100 (100cps, 15")	\$499
OKIDATA ML52 (80cps, 10")	\$450
OKIDATA ML53 (100cps, 10")	\$779
OKIDATA ML54 (200cps, 15")	\$880
OKIDATA PACEMARK 2410 (350cps, 15")	\$2299
OKIDATA P30 (400cps, 15")	\$1799
SEAMING 185 (120cps, 10")	\$279
GEMINI 155 (120cps, 15")	\$429
DATAPRODUCTS 8000 SERIES (dot matrix, LQ)	CALL
TDHBA P1340 (LQ dot matrix, 10")	\$799
TOSHIBA P1351 (LQ dot matrix, 15")	\$1499
TR-800 (LQ dot matrix w/rot cart)	\$799
EPSON LQ-1500 (LQ dot matrix)	CALL
OKIDATA 5300AP (400cps LQ)	\$1749
OKIDATA 5300CS (100 cps on wheel)	\$2999
NEC 2050 (durable, low cost LQ)	\$979
NEC 2050 (350cps LQ)	\$1749
NEC 7330 (80cps LQ)	\$1999
CITIZEN STARPRINTER (400cps LQ)	\$1999
CITIZEN PRINTMASTER (550cps LQ)	\$1499
QUME SPRINT 1140 (400cps LQ)	\$1399
QUME SPRINT 1555 (350cps LQ)	\$1999
BROTHER HF-26 (200cps LQ, 15")	\$999
DYNAX DX-15 (170cps, LQ, 10")	\$499

Hard Disk Drives:

SYSGEN 10MB HARD DISK (w/streamer)	\$2999
SYSGEN 20MB HARD DISK (w/streamer)	\$2999
SYSGEN image (back-up for XT)	\$ 848
TECMAR 10 + 5 + 15 + 5, 33 + 5MB exp chassis	from \$2999
PEACHTREE PERIPHERALS 10MB internal hard disk	\$1999
INAT removable 10 & 20 MB flexible media drives	CALL

Multifunction Media Drives:

ORCHID BLDSOM (64-384K S.P.C.C apt G Net.)	BEST PRICE
AST 8-PK (64-384K S.P.C.C apt G)	from \$279
AST MEDIA - (64-512K S.P.C.C apt S.P.C.)	from \$299
AST LQ PLUS (S.P.C.C apt S.P.C.)	from \$129
OUTBOARD I (64-256K S.P.C.C)	from \$279
QUADBOARD 384K (64K, 384K S.P.C.C)	from \$299
TECMAR CAPTAIN (64-384K S.P.C.C)	from \$299
BARY BLUE II (64-256K 2800S 2S P.C.C)	from \$499
all of these boards include utility software	
WAYWARD CONTROLLER CARDS	from \$199

*New eBASE alternatives

Display Cards:

PERSTV 800 (finely clear text on a color monitor)	CALL
STB GRAPHX PLUS (mono, color, par)	\$399
PROFIT MULTIGRAPH (mono, color, opt par)	\$499
TECMAR GRAPHICS MASTER (640x400 + mono)	\$499
QUAD COLOR I and II (color, hires opt/par)	\$219
AMDEK NAI (mono, color, par, w/HALD)	\$429
HERCULES (hires mono, runs LOTUS)	\$350

Monitors:

AMDEK COLOR II (720x480 bright colors)	\$549
AMDEK COLOR II + (color monitor)	\$399
AMDEK 300 A and G (Amber or Green)	\$149-\$139
AMDEK 300A (Amber to 8MB) price)	\$779
PGS SR-12 (850x480 non-terminated)	\$699
PGS SR-12 (850x480 terminated)	\$479
PGS MAX-12 (720x350 mono)	\$189
TALAM RGBmonitor (hires color monitor)	BEST PRICE

Modems:

HAYES 300 baud external	\$299
HAYES 1200 (300 or 1200 baud ext)	\$499
HAYES 1200 (300 or 1200 baud int w/soft)	\$479
RIDON and U.S. ROBOTICS	CALL

Chips:

64K RAM CHIP MEMORY UPGRADE (set of 3)	
200 pins, full 90 day warranty	\$49

Networks:

ORCHID PC NET PLUS STARTER KIT	\$1149
ORCHID PC NET PLUS NODE CARDS	\$549

Miscellaneous:

INTEL 8087 COPROCESSOR (high speed math)	\$199
ISDNAR SURGE PROTECTORS (4 & 8 plug)	\$59.97
KEYTRONIC 5151 KEYBOARD (sep. cursor keys)	\$299
MOUSE SYSTEMS (optical mouse, runs LOTUS)	\$199
POWER BACK-UP (200 & 400 watts)	\$269-\$499
ORCHID PC TURBO (80186 coprocessor)	CALL
ORCHID PC TURBO (80186 coprocessor)	from \$139
BRET SALTER'S new debug board w/serial	CALL

Software:

SYNPHONY (new from LOTUS)	BEST PRICE
FRAMEWORK (new from ASHTON-TATE)	CALL
MULTIMATE (updates Wang dedicated WP)	\$299
WORDSTAR PRO-PK (new version)	\$399
PFS Write, Report, File and Graph	each \$39
BASE II (from Ashton-tate)	from \$299
KNOWLEDGEWARE (version 1.06)	\$219+
BASE 4000 & 6000	from \$299
POWERBASE (relational, hierarchical)	\$299+
CIP (new and fantastic!)	CALL+
DAYFLOW (new type of database)	CALL+

LATTICE C COMPILER (version 2.0)	\$299
DIGITAL RESEARCH (all products)	CALL
MICROSOFT (all products)	CALL
DOV JONES (all products)	CALL
NUS A/R, A.P. G.I.	\$299
HONARD TAX PREPARER	\$199
FINANCER II	\$119
DECISION RESOURCES CHART MASTER	\$259
BPS BUSINESS GRAPHICS	\$259
Z-SOFT PC PANTHUR II w/TWEEZE GRAPHICS	\$99
PRINTER VERSION 3.0	\$99
SET-EX for your EPSON	\$49
NORTON UTILITIES	\$49
COPY II PC by CENTRAL POINT	\$39
COMPOSITIVE STARTER KIT	\$39
SIDEWAYS by FUNK SOFTWARE	\$49
HAYES SMART COM II	\$109
CROSS TALK XMI by MICROSTUF	\$109
RELAY communications package	\$99
ALL MACINTOSH SOFTWARE	CALL

IBM PCs for less:

IBM PC w/256K, 2 360K drives, controller	\$1995
AST 6-PK, HERCULES GRAPHICS monochrome adapter, AMDEK 300A monochrome monitor and BROTHER HR-25 LQ printer w/cable	\$3499

IBM PC w/256K, 2 360K half height drives, 10MB PEACHTREE PERIPHERALS internal hard disk, controller, AST 6-PK, TECMAR GRAPHICS MASTER hires color and mono adapter, AMDEK COLOR II hires color monitor, EPSON FX-100 w/cable	\$5199
--	--------

(These systems are brand new, shipped fully tested and burned in, fully warranted for 90 days and ARE ALWAYS IN STOCK!)

PROGRESSIVE MICRO DISTRIBUTORS

"IBM PC System Enhancement is Our Business - Personal Service is Our Commitment"

FOR ORDERS ONLY

1-800-446-7995

for further information and technical support

1-404-446-7995

7000 Peachtree Industrial Blvd.

Norcross, Georgia 30071

all prices are subject to change

IBM is a registered trademark of International Business Machines

CIRCLE 366 ON READER SERVICE CARD



Coming Up



The HP 110 Portable Computer

The HP portable stores 1-2-3, MS-DOS Version 2.11, the Memotext word processor, and a selection of other software in ROM. Memory capacity totals over half a megabyte. If you're looking for a powerful portable, the HP 110 may be the machine you'll carry off into the sunset. Read all about it in an upcoming issue of PC.

Word Processing Roundup

PC will rustle up 19 of the most popular word processors and put them through their paces. We'll compare the packages function by function and chart how each is carried out. In addition, our authors will offer their personal views on the effectiveness of the word processors. The objective: to allow you to choose the word processing package that best suits your needs.

Attaché Accounting Software

Price Waterhouse examines an accounting software package from Attaché Software, Inc., an Australian firm making its debut in the U.S. market. An aggressive marketing plan for this software includes setting up regional training centers for consultants, as well as "hot-line" technical support to consultants and dealers. The question is, does your company need this support for its accounting software?

Corporate MBA

Context Management Systems' first product, *Context MBA*, has been called the "grandfather of integrated software" and owns the distinction of being the first integrated software package for micros. The first version of *Corporate MBA* added IBM 3270 terminal emulation and powerful macro command facilities to the integrated package, but it was written in Pascal. Now there's a version written in MS-DOS for the PC. We'll take a look at what the new version can do for you.

Micro/PROPHIT

Presenting the Micro/PROPHIT financial modeling language for the PC. If you have used and liked *PROPHIT II*, a timesharing, financial modeling language, you may just want this new package designed for your microcomputer.

Professional tools
for the software
developer and
business
system user.

ProTools™

MORNING STAR SYSTEMS, INC.

ProLibrary

Professional C Compiler Tools

These tools go beyond access to ROM Video and DOS 2.0 functions. Tools to write 8088 interrupt handlers and DOS 2.0+ device drivers. Flexible segment offset addressing functions. DOS 2.0+ path handlers, set environment, run-time batch commands, and execution executive. DOS 3.0 upgrade. Latex 2.0 compatible.

ProBatch

Professional Batch Tools

Sophisticated batch commands to control job execution, aimed to change or display file attributes, when to control job execution by time, day or date, test-with/leave to control job execution sequence, pr for flexible file printing, mount to access floppy disks by volume id. Many other powerful batch commands. All commands may be piped. All commands use 2.0 path. All commands controlled by set environment.

ProScreen

Professional Screen Manager

Editor for creation and management of screens. Screen storage in file or in program. Data entry screens, menus, windows and on demand help. Forms and box generation. On screen buttons and graphics/memo icons. Mouse and light pens supported. Run-time access by LINK library or by interrupt function.

ProLibrary (includes Source) . . .	\$200.00
ProBatch . . .	\$200.00
ProScreen . . .	\$300.00
ProScreen (with C Source) . . .	\$450.00
Microsoft C Compiler . . .	\$400.00
Latex C Compiler . . .	\$400.00

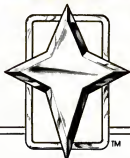
Shipping & Handling Additional VA Residents
4% Sales Tax: MD/VISA/CODI Check-OK

(703) 425-6422

Dealer Inquiries Welcomed

MORNING STAR SYSTEMS, INC.

9202 Alyssum Way
Annandale, VA 22003



CIRCLE 127 ON READER SERVICE CARD

Introducing the Most Powerful Business Software Ever!

TRS-80™ (Model I, II, III, or 16) • APPLE™ • IBM™ • OSBORNE™ • CP/M™ • XEROX™



The VERSABUSINESS™ Series

Each VERSABUSINESS module can be purchased and used independently, or can be linked in any combination to form a complete, coordinated business system.

VERSA RECEIVABLES™

\$99.95

VERSA RECEIVABLES™ is a complete menu-driven accounts receivable, invoicing, and monthly statement generating system. It keeps track of all information related to who owes you or your company money, and can provide automatic billing for past due accounts. VERSA RECEIVABLES™ prints all necessary statements, invoices, and summary reports and can be linked with VERSA LEDGER II™ and VERSA INVENTORY™.

VERSA PAYABLES™

\$99.95

VERSA PAYABLES™ is designed to keep track of current and aged payables, keeping you in touch with all information regarding how much money your company owes, and to whom. VERSA PAYABLES™ maintains a complete record on each vendor, prints checks, check registers, vouchers, transaction reports, aged payables reports, vendor reports, and more. With VERSA PAYABLES™, you can even let your computer automatically select which vouchers are to be paid.

VERSA PAYROLL™

\$99.95

VERSA PAYROLL™ is a powerful and sophisticated, but easy to use payroll system that keeps track of all government required payroll information. Complete employee records are maintained, and all necessary payroll calculations are performed automatically, with totals displayed on screen for operator approval. A payroll can be run totally, automatically, or the operator can intervene to prevent a check from being printed, or to alter information on it. If desired, totals may be posted to the VERSA LEDGER II™ system.

VERSA INVENTORY™

\$99.95

VERSA INVENTORY™ is a complete inventory control system that gives you instant access to data on any item. VERSA INVENTORY™ keeps track of all information related to what items are in stock, out of stock, on backorder, etc., stores sales and pricing data, alerts you when an item falls below a preset reorder point, and allows you to enter and print invoices directly to link with the VERSA RECEIVABLES™ system. VERSA INVENTORY™ prints all needed inventory listings, reports of items below reorder point, inventory value reports, period and year-to-date sales reports, price lists, inventory checklists, etc.

VERSA LEDGER II™

\$149.95

VERSA LEDGER II™ is a complete accounting system that grows as your business grows. VERSA LEDGER II™ can be used as a simple personal checkbook register, expanded to a small business bookkeeping system or developed into a large corporate general ledger system without any additional software.

- VERSA LEDGER II™ gives you almost unlimited storage capacity (300 to 10,000 entries per month, depending on the system),
- stores all check and general ledger information forever,
- prints tractor feed checks,
- handles multiple checkbooks and general ledgers,
- prints 17 customized accounting reports including check registers, balance sheets, income statements, transaction reports, account listings, etc.

VERSA LEDGER II™ comes with a professionally-written 160 page manual designed for first-time users. The VERSA LEDGER II™ manual will help you become quickly familiar with VERSA LEDGER II™, using complete sample data files supplied on diskette and more than 50 pages of sample printouts.

CIRCLE 266 ON READER SERVICE CARD

SATISFACTION GUARANTEED!

Every VERSABUSINESS™ module is guaranteed to outperform all other competitive systems, and at a fraction of their cost. If you are not satisfied with any VERSABUSINESS™ module, you may return it within 30 days for a refund. Manuals for any VERSABUSINESS™ module may be purchased for \$25 each, credited toward a later purchase of that module.

To Order: Write or call Toll-free (800) 431-2818 (N.Y.S. residents call 914-425-1535)

- * add \$3 for shipping in UPS areas
- * add \$4 for C.O.D. or non-UPS areas

- * add \$5 to CANADA or MEXICO
- * add proper postage elsewhere

DEALER INQUIRIES WELCOME

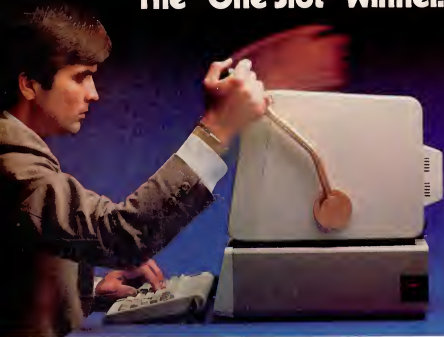
All prices and specifications subject to change / Delivery subject to availability

COMPUTRONICS

50 N. PASCACK ROAD, SPRING VALLEY, N.Y. 10977

* TRS-80 is a trademark of the Radio Shack Division of Tandy Corp. * APPLE is a trademark of Apple Corp. * IBM is a trademark of IBM Corp. * OSBORNE is a trademark of Osborne Corp. * CP/M is a trademark of Digital Research. * XEROX is a trademark of Xerox Corp.

Rio Plus II™ For The IBM PC Or XT. The "One Slot" Winner.



All The Power & Performance You Can Handle In One Exceptional Multi-Function Board.

When it comes to getting more usable features, greater performance, and better benefits into—and out of—your IBM Personal Computer... Rio Plus II is the *very best* multi-function board you can buy. Why? Because the Rio Plus II includes the very best features of *two* power-packed multi-function boards (the Rio Plus, and Super Rio)—conveniently built into *one*. Without a bet, the Rio Plus II offers the *most complete* one slot answer to your need for greater memory and additional ports.

"Pack" The Odds In Your Favor

Now, you can have almost everything you want or need. All in one slot. Rio Plus II gives you: One or two serial ports; a parallel port; an IBM compatible game port; the PC Accelerator™ software (offering emulation of *two* RAM disks and a parallel print buffer); a battery operated clock calendar (remembers date/time even with PC turned off); and *additional memory* of up to 384K.

Using the RS-232C serial ports, you can easily connect

mice, modems, plotters, (serial) printers, or other necessary peripherals. With the parallel port, you'll be able to operate any IBM compatible (parallel) printer, or SASI (Shugart

Associates Standard Interface) hard disk controller. And courtesy of the PC Accelerator™, you get printer buffering and RAM disks which can even survive a warm boot. (For example, do an ordinary reset, and all the data entered on both RAM disks will *still* be there. *Everytime.*)

The Winning Combination

Rio Plus II is totally software compatible with IBM's hardware adapter boards. And, the Rio Plus II saves you time, money, slots...*and* hassle. You'll have additional memory and functions available—*exactly* when you need them. At a price that's *very* competitive. And just think what you can do with all the *other* slots.

Rio Plus II. The only (card) game in town that *consistently* lets you win big. See your local dealer for the inside story. Or call or write STB Systems, Inc., 601 North Glenville, Richardson, Texas 75081 (214) 234-8750.

CIRCLE 430 ON READER SERVICE CARD



STB™
STB Systems, Inc.

IBM PC, XT are registered trademarks of International Business Machines Corporation.

Expanding Microcomputing

PC Accelerator is a registered trademark of RealCorp.



WHAT A PAIR !

Tecmar's Graphics Master™ & Lotus 1-2-3¹

Graphics Master is the only board that creates both monochrome and color graphics for Lotus 1-2-3.

You can also run IBM compatible software because Graphics Master emulates both the IBM Color Graphics Adapter and the Monochrome Adapter.

We are pleased to announce that Graf-Talk² and MetaWindow³ software take full advantage of Graphics Master's high resolution graphics.

Graphics Master is the only board that will do all of the following with appropriate software:

- High resolution color graphics - 640 x 400, 16 colors
- High resolution monochrome graphics - 720 x 700
- Run software for IBM Monochrome Adapter
- Run software for IBM Color Graphics Adapter



TECMAR
the power behind the PC

Tecmar Inc. 6225 Cochran Road Solon (Cleveland), Ohio 44139-3377 Phone: (216) 349-0600 Telex: 466692

¹ Registered trademark of the Lotus Development Corp. ² Registered trademark of the Redding Group Inc. ³ Registered trademark of the Metagraphics Corp.